1 IRONSTONE

DRAGON USER

The independent Dragon magazine

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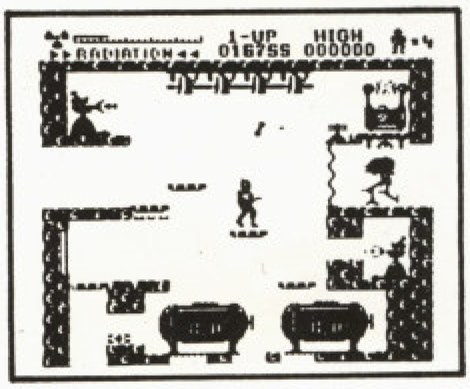
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How to submit articles

The quality of the material we can publish in *Dragon User* each month will, to a very great extent depend on the quality of the discoveries that you can make with your Dragon. The Dragon computer was launched on to the market with a powerful version of Basic, but with very poor documentation.

Articles which are submitted to *Dragon User* for publication should not be more than 3000 words long. All submissions should be typed. Please leave wide margins and a double space between each line. Programs should, whenever possible, be computer printed on plain white paper and be accompanied by a tape of the program.

We cannot guarantee to return every submitted article or program, so please keep a copy. If you want to have your program returned you must include a stamped, addressed envelope.

Contents

SUNSHINE

Editorial

This month marks the beginning of a new phase for Dragon User — indeed Dragon users all over the country. As from next issue (July 1986) Dragon User will be available to the Dragon community BY SUBSCRIPTION ONLY. And while this means that you won't have to trundle down to the newsagent to get your favourite read (we'll send it to you), it does mean forking out just over a tenner in one month, in order to get the next 12 issues, if you don't already have a sub. So why do it?

It's our firm belief that Dragon User is still essential reading for all Dragon owners, beginners and experienced alike. We'll still have all the same regular features, news and reviews, with new ones planned even as I write! In fact, as a controlled circulation publication, we're hoping to pack even more in than usual — a new upgrading series, new languages for your Dragon, teach-in's, reader offers, competitions — we are determined to provide you with the service and information you want for your computer.

Take the Book Offer in this month's issue . . . where else could you get so much for so little?

As the number of active Dragon owners has diminished (and there's no denying that the total is down to the few tens of thousands) it seems to us that the enthusiasm of the existing Users has actually increased — and it's people like you we are committed to supporting in the future.

It would be a shame if many Dragons (still a worthwhile piece of hardware — until the £300 Amiga arrives!) were put away, all for the lack of information and a regular national magazine. No Dragon User — no Dragon? We hope you'll join us.

Letters

This is the chance to air your views — send your tips, compliments and complaints to Letters Page, *Dragon User*, 12-13 Little Newport Street, London WC2H 7PP.

Mail Order

I RECENTLY had cause to return my Alldream cartridge to Grosvenor Software, as I just couldn't get it to work. It arrived back 48 hours later with a letter explaining how to ensure good connector contact, and the cartridge connectors had been tinned for good measure.

I call that excellent service, and shows how buying goods for our Dragon by post may not necessarily be as risky a business as your April editorial implies.

Martin Parker
14 Redwood Close
Radstock
Bath

Poke Error

IN the April 1986 issue of *Dragon User*, Brian Cadge answered Neil Peel with a short routine to send all that appeared on the screen to a printer. This routine did not work due to the small typing error in the listing of the last POKE being POKE 361,284 whereas it should have read POKE 361,248. I am sure that many Users have written in to point out this error but in case they haven't I am. As proof, this letter has been written using the very routine.

Andrew Jenkins
44 Tudor Terrace
Gadlys, Aberdare
Mid-Glamorgan
South Wales
CF44 8EB

Co-Co Flee

HAVING spent many hours typing "Flee" from the March edition of *Dragon User* into my 32K Tandy Colour Computer, I was disappointed to find that there were several areas involved where the Dragon differs from the Tandy.

However, by disassembling the machine code and consulting your (much-appreciated) Firmware series, I was able to spot the problems in the code, and (I hope) solve them.

Here are the changes which are necessary for the game to work:

```
50 ON USR 0(S)GOTO 300,60,10,700
920 IF PEEK(338)=251 THEN N=999
930 IF PEEK(342)=254 THEN DEM=1:
    N=999
9130 NEXT:POKE 31068,179:
     POKE31069,233
9140 POKE 31113,180:POKE 31114,242
9150 POKE 31129,180:POKE 31130,242
9160 POKE 31225,180:POKE 31226,242
9170 POKE 31252,180:POKE 31253,242
9180 NEXT AD:RESTORE:RETURN
```

I hope you will consider printing this letter, as it will enable all Tandy 32K owners to play this excellent game.

P A Chirico
158 Empingham Road
Stamford
Lincs
PE9 2SZ

Flee Flaw?

THE PROGRAM Flee Flea in March's issue — I typed the whole program in, about 12 hours long. The problem is, when I ran the program nothing happened. But I did check the program, and it was correct.

Danny Bowles
32 Bridge Street
Milnrow
Lancs

If you typed it in on a Tandy Co-Co, Danny, you'll need the alterations we printed this month. Otherwise, all we can say is — it works!

Upgrade

I AM sure you will be pleased to know I have just managed to purchase an upgrade kit for my 48K Spectrum — it's called a Dragon 64! I am sure that this news will lighten a few hearts, as it has done my pocket. The real problem is, that reading through your magazine, I realise how much I have missed, for example, what the hell is an OS-9?

In fact, the only fault I could really find in your mag, or should I say, the only fault I knew the meaning of, was that nasty swear word, *Jet Set Willy*.

Now come on — there must be something, some book, some program, some potential pen-pal that would be able to teach me more. Even Clive (our cat) knew more about the Dragon than I did — and even that was restricted to the CLOADM command (DIM CAT).

So please help — before I start suffering Sinclair (or is it Amstrad) withdrawal symptoms.

Robert Hammond
24 Beechtree Close
Oakley
Basingstoke
Hants

2 + 2 = 4

I DO hope that my embarrassment of the esteemed Brian Cadge only awarding two 'Dragons' to my excellent Disk-Kit product (Reviews, *Dragon User*, May issue) is, as suggested by one of my very satisfied customers, a case of missing 'Dragons'.

He points out that every review normally has the Dragons right or left justified — whereas these two are centred, suggesting that two have been dropped off the right-hand corner.

Should the two Dragons be his considered opinion, then I am obviously wasting my time on the Dragon.

Pam D'Arcy
21 Wycombe Lane
Wooburn Green
High Wycombe
Bucks, HP10 0HD

Oh the embarrassment — yes Pam, I'm afraid two Dragons flew the coop in the May review . . . indeed Disk-Kit was originally awarded four Dragons — and well deservedly too.

Hunter

I WISH to bring to the attention of any software hunter for the Dragon, a Blockbuster sale, where some excellent games were advertised in the April edition. There were a total of four whole pages of software programs on offer — which ended on March 31?

This I must query. How can you put an advert in a magazine that ended the month before?

I find the only way to obtain software now, is to order through magazines — I have found *Dragon User* very useful to obtain software, but now I have my doubts.

I have found it impossible to buy *Dragon User* before the month it should appear. Could we please have offers ending, not before you buy the magazine, but after?

Dawn Gamble
Lisburn
Co. Antrim
BT27 4LB

Bloody but unbowed, the *Dragon User* staff hold their heads high after such a tirade of irony. The offending Advertisement Manager has been shot.

Co-Co Club

I WOULD like to start up a CoCo/Dragon users club in the Basildon area, to swap programs, ideas, etc. Anyone interested, please contact me at the address shown below.

S R Kilcoin
187 Spurriers
Laindon
Essex
SS15 5NG

Fringe

RE User Groups and the Dragon — there are many different aspects of the Dragon and the 6809 microprocessor that it is impossible that any one group or publication can satisfy all the possibilities.

The National Dragon User's Group does not have a monopoly and is in no way "official". So any other group, from "lunatic fringe" to dedicated professional is welcome. All that is required is enthusiasm and a common interest. Bulletin boards are also a form of user group — and I thank all those who have set them up.

On a more serious note the Data Protection Act comes comes into force on the 11 May 1986 and may have an impact on user groups, clubs, bulletin boards and anyone storing names/addresses etc. on a computer. If any reader needs more information they should contact The Data Protection Registrar on Wilmslow (0625) 535777.

Stan Opyrchal
Compusense

Dragon User People's Chart

BREATH holding time . . . anything can happen in the *Dragon User* People's Chart . . . and look what's happened this month. The struggle for Number One spot continues with Shocktrooper back at the top and Juxtaposition dropping one place down to the Number Two slot. People obviously spent April indoors rediscovering Jet Set Willy, as it leaps into third place.

Legendary anagrams included, "Have I won yet?" from Robin Hemmings . . . (errrr . . . no Robin), some blatant crawling from Neil Coe (John Cook, Expert Editor) and a glum confessional from Alistair Grant (Anagrams don't like me). However, the prize goes to Ian Rockett, referring to the extra screens in Dragon JSW — "Dragon Heads get the pages Sinclair Boys don't." Nice work, Ian.

Don't forget — each month we are asking you to vote for your favourite five programs of the moment; they can be games, applications, utilities . . . anything! Write them down in order of preference on the form opposite (you can copy it out if you don't want to mutilate your issue) and send it.

Just for a bit of fun — and as an incentive to the more mercenary amongst us — you can also make up a phrase constructed from the letters of your own top three (using as many as you can) and we will pick out the one we consider to be best. That lucky winner will be receiving £25 worth of software from Microdeal.

Results April 1986

1 Shocktrooper .... (Microdeal)
2 Juxtaposition .... (Wintersoft)
3 Jet Set Willy .... (Software Projects)
4 Speed Racer .... (Microdeal)
5 Eddie Steady Go .... (Incentive)

Chart Five

Voting for Chart No. 5 closes at 1pm on Friday 13th June 1986. Entries received after that time will not be eligible for inclusion in that month's voting. The editor's decision is final. Only one entry per individual per month will be allowed.

My top 5: Voting Month 5

1. ....
2. ....
3. ....
4. ....
5. ....

Name ....

Address ....

....

....

....

....

My phrase is: ....

If you have any new products for the Dragon — software or hardware — ring the News Desk on 01-437 4343

Dragon Aid Tape

GOOD NEWS — following the disappointment that, for a second year, Dragon owners were not to be given the opportunity to join in with the software industry's charity effort (last year *Soft Aid*, this year *Off the Hook*), it looks like we might be in with a chance after all — thanks to Christopher Bayne.

Bayne, proprietor of CB Software, is proposing to put together a compilation tape exclusively for the Dragon — and like *Off the Hook*, proceeds would go to the Prince's Trust for the rehabilitation of drug addicts. "I was annoyed last time round that we didn't get a chance; this time we've been excluded again! Dragons deserve a chance," he commented.

Chris is aiming at 5-10 titles on one tape, selling for £6.95 to £9.95, depending on quantity and quality. "I've already got support from Design Design and Peaksoft, and have contacted Microdeal," he continued. "I'm looking for anything from text adventures to shoot-em-ups, primarily commercial software — but if anyone wants to donate their own programs, we will consider them."

Chris was quick to emphasise that after costs have been recovered (primarily tape duplication and postage), all pro-



fits would be going to charity. "I'm not taking anything," he said. "It's all for a good cause."

● *Dragon User* has already pledged full advertising support for the venture, so come on . . . if there are any companies or individuals out there that can help CB Software put this project together, write to 58 Ash Grove, Wheathampstead, St Albans, Herts, AL4 8DF — or phone 058283 2916. Watch this space for developments.

Peaksoft sponsor Dragon

AS A service to the fast-growing number of Dragon owners on Micronet, Peaksoft are sponsoring Dragon news pages in The Gallery section — page 323000191 onwards.

The firm are also compiling a directory of Dragon owners who use the service, to help Dragon fans near and far to keep in touch. A free copy of the directory, which is updated weekly, is given to every purchaser of a modem from Peaksoft, and to anyone who requests inclusion in the directory. Further copies, or later editions, are available in return for 50p in stamps.

Details available from Peaksoft at 48 Queen Street, Balderton, Newark, Notts, NG24 3NS.

Dragon weekend

THE SECOND 'Dragon weekend in Wales' took place at the Tredfeddian Hotel in Aberdovey between 21st and 23rd March. Attendances were up on last time (October 1985), with many users attending their second weekend, although the bigger venue meant that there were still a few places left unfilled.

There was a relaxed and friendly atmosphere from the start, and all types of users from the young to the not-so-young, from new tape-based 32 owners to OS9 experts, enjoyed a weekend of solid 6809 computing.

Those devotees of the 6809, Compusense, were on hand, demonstrating their new Dragon Plus expansion system, and had disk, as well as their new bulletin board software.

Many tips could be picked up simply by listening in on conversations going on around the room, from recovering crashed disks, to linking Dragon's as intelligent terminals. Plenty of suggestions were forthcoming regarding the way the Dragon Market, and *Dragon User* in particular should go, but everyone agreed that the Dragon has a lot of life left in it yet!

It is not certain if another long weekend will be organised; that's really up to you. If you want one, then write to Bob Morgan, Mid Wales Tourism Council, Canolfan, Owain Glyndwr, Machynlleth, Powys.

Micro Vision News

FOLLOWING the success of *Beanstalker*, their first release, Micro Vision has just announced its next game, *Talisman.* Described by a Micro Vision spokesman as, "a *Jet Set Willy* style graphic arcade adventure," plus the promise of over 100 screens, they could be on to anothe winner.

The game, heavily steeped in Mythology, involves the exploration of a castle (and the woods and fields beyond — if you can get out!) to find a magical talisman.

If first reports are anything to go by — including your possible transformation into a frog, then back again in true fairytale manner — it could be worth looking at. Priced at £7.95, Micro Vision expect to have the game ready for the Leeds show, so why not pop along and have a look?

For more details, contact Micro Vision at 8 Wensley Road, Liverpool, L9 8DW.

Preview

FAR, FAR into the future, the Sol Federation constructed the TIME GRIDS — zones of neutral matter used by Hyperspaceships for faster-than-light travel. Because of the heavy traffic on the grids it was then decided to extend them. However, in doing so they uncovered a sleeping Time Demon.

They carefully erected the grids around him but were unable to stop his regeneration process.

It was then that they called on you, Time Lord, a genetically engineered Supernaut capable of travelling in the grids without the aid of a spaceship.

Your task is to find the four pieces of the Demon's Talisman, which is scattered in the grids, and use it to destroy him.

Unfortunatly. the creatures evil presence has contaminated the grids.

Well . . . sounds like someone's got a distinctly overactive imagination at Incentive! Still, there you are — details of the scenario of Time Lord, their next release. 84 rooms divided into three maze areas; eight different types of nasty, laser turrets, reactors . . . can't wait.

Priced at £7.95, it should be available from Incentive by the middle of June. Contact them for further details at 54 London Street, Reading, RG1 4SQ, or telephone (0734) 591678. Look out in Arcade Arena for a preview, next month.



Communication

Send in you questions, requests, and pleas to Communication, Dragon User, 12-13 Little Newport Street, London WC2

Problem I have recently acquired an Atari joystick and equipment to convert it to a Dragon. I would be very grateful if someone could inform me how to wire it up.
Enquirer Andrew French, 13 Fairfield, Penperlleni, Pontypool, Gwent, NP4 0AP.
Problem I have a Dragon 32 and am very pleased with it. However, what are the pro's and con's of changing to a Dragon 64 (assuming I can get one second-hand) — apart from the larger memory? Would I still be able to use my HR5 Brother printer with the 64?
Enquirer J E Lawrie, 15 Sycamore Grove, Southam, Warwickshire.
Problem I would be very happy if anyone could answer a couple of questions which bother me recently. a) Could the second CPU for the Dragon 32 be any CPU or just an 8-bit one — if yes then could that be a 6502 (8-bit) one? b) Could you have a disc system without having a second CPU, and if not, what type of CPU would that be?
Enquirer Yionnis Grekas, 9 Knosou St, Galatsi 11146, Athens, Greece.
Problem I have recently purchased a TRS-80 CGP-115 (compatible with the TRS-80 CGP-220) four colour printer and I was wondering if anyone could tell me how I can dump the graphics screen on my Dragon 32 to the printer.
Enquirer C Carey, 57 Eastbourne Grove, Westcliff-on-Sea, Essex, SSO 0QE.
Problem I cannot obtain an OS9 Programmers Manual — has anyone got one for sale, or could I borrow a copy?
Enquirer Tony Dangerfield, 26 Lonsdale Drive, Croston, Nr Preston, Lancs, PR5 7SB.
Problem Require the Dragon Games User Group Newsletter — will pay up to £1.00 in good condition. Also Dragon wings cassette — will pay up to £1.75. Please send details.
Enquirer Andrew Hill, 13 Parry Jones Close, Forge Srdo, Blaina, Gwent, South Wales, NP3 3NH.
Problem Wanted — Super Dragon Writer II Cartridge or name and address of distributor. Also wanted — name of a good book on electronics for beginners.

Enquirer Barry Caruth, 132 Donaghadee Rd, Bangor, Co Down, Northern Ireland, BT20 4NH.

Problem Dragon owners in the Gosport area — I own a Dragon but don't know anyone else who does. I am very lonely!

Enquirer P J Beed, 27 Findon Road, Elson, Gosport, Hants, PO12 4EP.

Communication

Stuck for a routine? Need some obscure equipment? Feeling cut off? Fear not — someone, somewhere can help you! Write down your problem on the coupon below (make it as brief and legible as possible) together with your name and address and send it to Communication, Dragon User, 12/13 Little Newport Street, London WC2H 7PP. We'll publish it as soon as we can — meanwhile, maybe there's someone you can help this month!

Problem..

....

....

Name..

Address..

....

Dragonsoft

New software for review should be sent to *Dragon User*. 12-13 Little Newport Street, London WC2H 7PP.

Arcade Hit

Program *Moon Cresta*
Price £7.95
Supplier Incentive Software, 54 London Street, Reading, RG1 4SQ. Tel: (0734) 591678

ONE MORE go . . . just one more go and I'll crack it. This is something you will say a lot when you part with your hard earned pennies in exchange for a copy of Incentive's latest release *Moon Cresta*. In fact you will probably say it for hours on end day after day. It's not that this game is addictive you understand; just one more go and I'll leave it alone, just one more go.

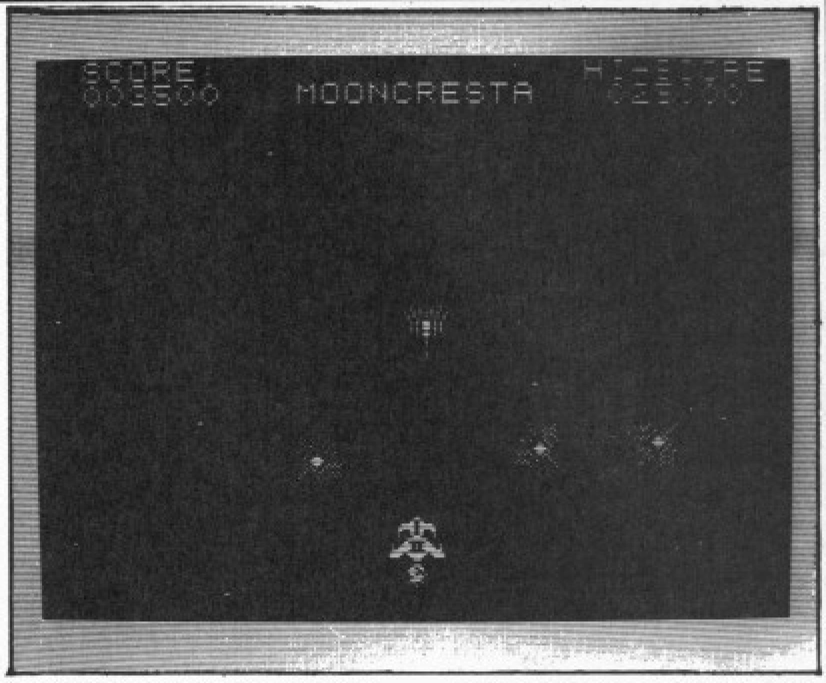
For those of you too young to remember the original arcade version of *Moon Cresta*, it was probably the first machine that I ever saw with a queue of people waiting to play it.

It has that marvellous quality that allows everyone to play a reasonable game straight away but gets progressively harder the better you become. You can never say that you have mastered it, it will always get the better of you in the end.

Incentive have obtained the official licence for the game from the originators Nichibutsu, and John Martin (the author) has produced the most faithful arcade copy that I have ever seen.

If you like the space shoot 'em up games then this must be the king of them all.

To aid you in blasting the cold eyes, supper flies, four-D's, meteo's and atomic piles, you are given a spaceship that consists of three parts, each having its own weaponry. If you successfully manage to repel four waves of inevitable aliens, then you are given the chance to dock your craft with the next section. If successful then you can double your firepower and (in theory) make life much easier for yourself. You start with just the top section of the spacecraft, with only one gun, and if you dock with the other two sections, you end up with five.



For those who think they have pretty good reactions when it comes to arcade games, if you manage to obtain a score in excess of 30,000 you will be given a secret message.

This enables you to enter a draw to win a real *Moon Cresta* arcade machine.

OK, so it's basically straightforward left/right/fire stuff — but if you like fast arcade action and are not frightened of spending all your waking hours muttering 'just one more go' then get your wallet out and buy yourself a copy.

Roy Coates

Editor

Program *Diskpix — Supplied on tape (Disc compatible)*
Price £3.
Supplier: Pamcomms Ltd., 21 *Wycombe Lane, Wooburn Green, High Wycombe, Bucks HP10 0HD.*

Diskpix is a quite powerful graphics editor supplied on cassette, but readily transferrable to disc. Side One of the tape contains the program, plus some demonstration programs. After loading the program checks if Dragonos is present (by looking at where the graphics pages start in RAM) and adjusts itself to operate with tape only, or disc and tape as applicable.

The software is supplied with the usual well written manual from Pamcomms.

The basic idea behind *Diskpix* is that graphics pages can be created and edited down to pixel accuracy and then saved for use in other programs, or as character sets. The whole thing is completely menu driven in the usual Pamcomms way.

The editing is done on a magnified version of the block, using the cursor keys to point to the required pixel, and then pressing the required colour number to fill in the pixel. It is also possible to clear the whole block to one colour for fast filling in.

Other editing functions include use of GET/PUT and copying and moving graphics pages around. Anyone who has a copy of Dragon Data's *Pixel Editor* (remember that?) will be interested to know that *Diskpix* files are compatible with those output by it.

Supplied with the program are character sets for use in Pmode 3, 20 columns, and Pmode 4, 42 and 51 columns. The demonstration programs include a nice version of the 'sliding puzzle' puzzle game, which unfortunately runs rather slowly in parts (a little machine code could go a long way here!).

All of the programs are totally unprotected and would be of interest to anyone new to programming in Basic graphics. However, the best thing about this software is its price, just £3 for a genuinely useful program, which once again shows just what skilful Basic programming can achieve.

Brian Cadge

Control

Program *Printer Control (Disc) — Dragondos/Cumana 2.0 dos.*
Price *from £20*
Supplier *MacGowan Consultants, 6 Arnhem Drive, Caythorpe, Nr. Grantham, Lincs. NG32 3DQ*

MacGOWAN'S powerful wordprocessor *Printer Control* has, at last, appeared on disc. I reviewed the cassette version back in the August '85 issue of *Dragon User* and gave it 5 out-of 5. All of the original functions have been kept in the disc version, these were explained in the original review, so I won't go through them all again here, but for anyone new to this program, what you get is a very powerful wordprocessor, (40 column screen) and a simple graphics editor.

The big difference between this and other wordprocessors is that MacGowan will supply a custom version to suit almost any printer (they claim to have done 57 varieties so far).

So to the disc version; a four page supplement is supplied to augment the main manual, explaining the slight differences in operation. A useful, and very necessary option for upgraders is the 'extension' program. This is loaded into the high-res pages used for the 40 column display and so does not affect any text file to RAM when called (the display reverts to 32 column). The extension menu allows access to Dragondos functions such as DIR, DSKINIT, KILL, RENAME ect. It also allows loading and saving of files to cassette.

Unlike the cassette version, the disc version only runs in 32k mode; it will not access the additional 32k on a Dragon 64. A little extra programming could have made it possible to use all of the available RAM surely? *Printer Control* was one of the first (and only programs to use the extra 32k on the 64.

Cassette owners will be glad to hear that MacGowan are offering an upgrade service, which depending on your printer type, will cost between £10 and £18 to replace your cassette with a disc and supplementary manual — a little expensive maybe, but at least they are offering the service to those who want it!

Brian Cadge

On-line Computing

Beginning an occasional series, ***Roy Cotes*** *takes a look at communications — starting with Chatplus 2 and Viewdata*

THE FASCINATING world of bulletin boards and other telephone-line-orientated information systems has been available to home micro users for quite some time now, and Compusense have just produced two packages which enable Dragon 64 users running Flex (and soon for OS9) to exploit just about any of these systems regardless of transmission speed or data format. The two packages are *Chatplus 2* and *Viewdata*.

Although there are many modems available on the market priced from £50 up to well over £200 the software has been written with the Demon modem in mind (although any other modem should work quite happily with this software).

Although the Demon modem is not BT approved, it is becoming more and more popular amongst the bulletin board users, owing to its excellent features per pound spent ratio. Having made enquiries through many of the bulletin boards, I could not find anyone who had anything but praise for the Demon. In fact, there are some bulletin board services which actually use a Demon modem as their link to the telephone network and hence to the user!

Demon

The Demon supports auto-dialling, originate and answer modes, either Bell or European telephone standards which enables those transatlantic calls to be made (preferably on some one else's phone bill!) and data transmit/receive speeds of between 75 baud and 1200 baud.

Physically, the modem is well constructed both inside and out, and being housed in a plastic box which is roughly the same size as a single disk drive, you won't have to fight for more table space to accommodate it.

The connections to the unit are made via flying leads which exit from the rear of the case. These are the power cable, the telephone cable, and the RS232 cable. The power for the Demon is derived from a transformer which forms an integral part of the mains plug. The telephone cable is terminated in a standard BT-type phone plug, and the RS232 cable is a 5-pin 'domino'-type DIN plug suitable for a BBC computer, although a suitable adaptor is available from the suppliers Compusense.

The first of the packages, *Viewdata,* allows a user with an appropriate modem to connect up to any of the Viewdata services such as the Prestel/Micronet systems which have proved so popular with BBC owners owing to the block graphics employed by the system (BBC MODE7). The *Viewdata* package shows a 40×24 character display as used by Prestel and the character set contains all the necessary block graphics to display the Prestel pictures. Even though the Dragon's limited display capabilities restrict this package to two colour operation, the effect is very impressive. The package allows the user to save, review and print frames from whichever system is being used. Flex commands may also be passed to the DOS for processing whilst the *Viewdata* package is in use.

Chatplus

The Chatplus package is a very comprehensive communications package with a multitude of options to allow connection to either bulletin boards via the BT network or to another Dragon (or any other RS232 computer sytem) using receive and transmit speeds of between 75 baud and 19200 baud. The data format (start/stop bits, number of data bits, parity, etc) is completely variable, with the most common settings being held ready at the press of a key. The default settings on invoking the program were used quite happily with all bulletin boards accessed for this review.

Like *Viewdata, Chatplus 2* allows auto-dialling for either data or voice calls. This feature is enhanced by the use of an on-line telephone directory which utilises a text file stored on disk containing the names, phone numbers and all the setting up details required for every entry, so that by simply typing the name of the bulletin board or person that you wish to contact, *Chatplus 2* will retrieve the setting up details and phone number from the disk file, phone the chosen number, and either put you on-line or prompt you to pick up the phone without any intermediate user intervention. For the secretive amongst us, *Chatplus 2* has an option which allows bulletin board passwords, etc, to be protected from prying eyes by substituting an asterisk (*) for each character typed until the <ENTER> key is pressed.

Because the flow control may be toggled between either the DTR or X-ON/X-OFF forms of protocol, *Chatplus 2* allows the Dragon to be connected directly to all sorts of other computer sytems. For the purpose of this review a Dragon 64 was connected directly to another Dragon 64 and information passed back and forth with no errors at 9600 baud. Connection was also made to both a DEC-VAX-11/780 cluster running under the VMS system and a DEC PDP-11/34 system running under RSX11-M. Again information was passed back and forth at 9600 baud and at 1200 baud with no errors.

The only problem with using a Dragon on a main-frame system is that of terminal emulation. Most mainframes expect the user to be using a specific type of terminal in order to utilise screen-editors and applications packages. Maybe a few terminal emulation packages could be made available? (Chatplus 3??).

The ability to up-load and down-load files enables information and programs on the bulleting board systems and mainframes to be down-loaded into the Dragon's memory or on to the Dragon's disk, and files already held on the disk may be up-loaded to the file area on the host sytem.

Compusense have also written a program designed to run either as a stand-alone package or from within the *Chatplus 2* program. It allows the transfer of data to or from the Dragon, using the XMODEM protocol found on many of the bulletin board services. I have only had time to use this software once to upload and download a program listing from a bulletin board and this worked with no problems encountered. The XMODEM standard of data transfer includes a checksum routine, which means that all incoming data is checked for validity before being stored. If an error is detected then the block is re-sent until either the data received is correct or the transfer fails more than a specific number of times. (This may be pre-set by the user.)

In conclusion, all the features of both software packages and trhe Demon modem worked as advertised. The software was fast, easy to use and reliable. If you have a modem and can stand the phone bill then you can't really go wrong with either of these packages — but you'll need a 64 running Flex, remember.

Extras

The only additional cost, for those who wish to access it, is the membership fee for the Prestel service. This is some £16.50 a quarter, but is good value if you are going to use it regularly. Prestel is only a local call and there is an incredible amount of constantly updated information available to its users. Everything from the latest news and weather to Mailbox systems, second-hand car sales, photography hints and tips, etc, etc.

Finally I would like to thank the Sysop's of all the bulletin boards that I have accessed whilst testing the software for this review. In particular the Tandy Users group bulletin board (TUG)), REACT, and the Liverpool Mailbox BBS. (The numbers for these are 01-200 7577, 0376 518818 and 051-428 8924 respectively.)

Hardware Demon Modem (Not BT approved)
Price £69.00 + p&p
Software Chatplus 2 & Viewdata
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Supplier Compusence, PO Box 169, 286D Green Lanes, London N13 5XA.

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Jaws!

Just when you thought it was safe to go back to the keyboard . . . arcade action from ***Steve Gathercole.***

IMAGINE yourself as a scuba diver out hunting fish. All you have to do is shoot the fish with your spear gun using the ‹ENTER› key. There are three fish, two of which are moving up and down, but the third fish is coming towards you and you must not let it reach your side of the screen else you will lose a life. You score 100 points for the fish moving down, 60 points for the fish moving up and 40 points for the fish moving towards you. There is also a random chance of an extra score — this happens if the fish coming towards you 'bumps' into any of the other fish you will score whatever the fish bumped into is worth, (after practice you can learn how to make this happen).

Shark

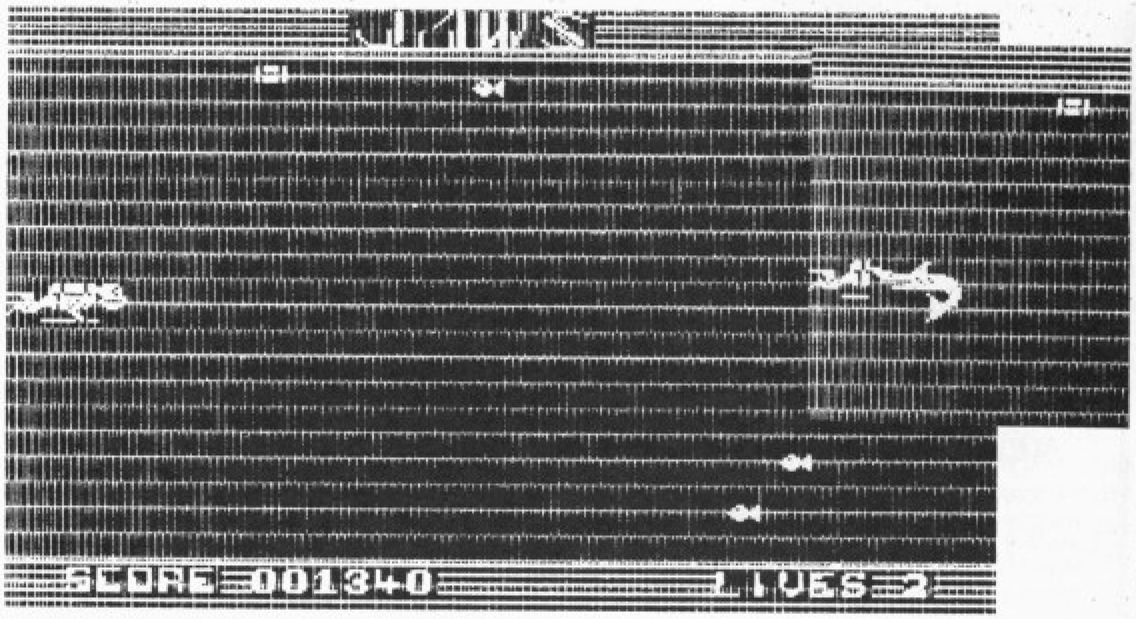
However, life is never that simple and you find that your lead boots are too heavy so you have to keep pressing the ‹UP ARROW› key to stop yourself falling — also after a random amount of time a very nasty Shark appears. You are frozen stiff with fright unable to move or shoot and your only chance to drop a depth charge on to the nose of the Shark. The depth charge is located at the top of the screen and is released by pressing the ‹ENTER› key, you must hit the Shark just in front of or on the nose, else the charge will not explode. If you hit the Shark you gain 1,000 points, if you miss, the Shark will come straight for you and eat you, (this is not a pretty sight).

The game is in PMODE 4, uses bit movement for smooth graphics, several sound routines and has a simple hall of fame at the end. To enter the game proceed as follows:

First type in LISTING 1 this is the hexloader, (as previously printed). Once RUN you will be asked for the start address, this is 28000. Type this in, press ‹ENTER› and you will be asked for the finish address, this is 31519. Type this in, press ‹ENTER›. and you must now type in the first row of L digits up to but not including the = sign, (LISTING 2). Press ‹ENTER›. You must now type in the checksum, this is the number in the column after the = sign. Type this in and press ‹ENTER› — if all is well the next address will be displayed. To save the whole game to tape use CSAVEM "JAWS",28000,31519,28000.

If you want to type in LISTING 2 in small parts, then when asked for the finish address type in the address you want to finish at, then when you get the 'OK' sign save to tape using CSAVEM"JAWS",28000,N,28000 where 'N' is the finish address you specified. Don't forget to CLOADM each part before running the hexloader next time. Each time you restart you use the finish address you specified last time as you start address.

To run the game type in EXEC 28000; if you have any problems, (with computing!!), contact me at 16 Hankinson's Est, Walpole St Andrew, Wisbech, Cambs 7NA PE14. Also I can supply a copy of the game for £1.50 which will include autorun. Good luck!



Listing 1

```
10 CLS
20 REM HEXLOADER - ENTER THE
30 REM STRING OF HEX DIGITS FIRST
40 REM AND THEN THE CHECKSUM
50 CLEAR200,27999
60 PRINT"ENTER START ADDRESS";:INP
UT START
70 PRINT"ENTER FINISH ADDRESS";:IN
PUT FINISH
80 FOR N=START TO FINISH STEP 11
90 PRINTN;":";
100 TT=0:INPUT A$:Z=0
110 FOR G=1 TO LEN(A$) STEP 2
120 P=VAL("&H"+MID$(A$,G,2))
130 TT=TT+P:POKE (N+Z),P
140 Z=Z+1:NEXT
150 PRINT" = ";
160 INPUT T$
170 IF T$ <>HEX$(TT) THEN SOUND 20
,30:PRINT"ERROR - ENTER LINE AGAIN
":GOTO 100
180 NEXT
```

Listing 2

```
28000 160A2F0000000000000000 = 4F
28011 0000000000000000000000 = 0
28022 0000000000000000000000 = 0
28033 0000000000000000000000 = 0
28044 0000000000000000000000 = 0
28055 0000000000000000000000 = 0
28066 0000000000000000000000 = 0
28077 0000000000000000000000 = 0
28088 0000000000000000000000 = 0
28099 0000000000000000000000 = 0
```

```
28110 0000000000000000000000 = 0
28121 0000000000000000000000 = 0
28132 0000000000000000000000 = 0
28143 00008000FFE08000000C00 = 2EB
28154 0C000C000C000C000C000C = 48
28165 202C202C202C102C082807 = 157
28176 E0002C004C008C010C020C = 1FF
28187 040C0BEC102C202C202C20 = 1FB
28198 2C202C202C318431843184 = 2E3
28209 3184318431843184 33A833 = 3E2
28220 A837B83DB03DB039A007C0 = 511
28231 14303A0C1D000E80070003 = 13F
28242 8001C002E0017020B81058 = 3D4
28253 0FE0315BFF7B31BDBD81BD = 5DE
28264 BDC00063D875A07B1C212C = 4B1
28275 4CD89A37F9A80842252648 = 473
28286 9A590496981D7009000900 = 2C4
28297 010000030000060 0E00E00 = F8
28308 7C1E003BFFF01FF6FC001B = 4F0
28319 7E003DFE03FFFF00000F00 = 3C9
28330 01070000870000CE0000FE = 25B
28341 0000F80000F00000E00000 = 2C8
28352 C0000100000300008000600 = D2
28363 18E00E00387C1E00703BFF = 382
28374 F8F01FF6FFF0001B7FF000 = 676
28385 3DFF3003FFF01800000008 = 37E
28396 00030000800060018000E00 = 37
28407 38001E0070FFFFF8F07BF6 = 61D
28418 FFF03F1B7FF005FFF03000 = 5DC
28429 00001800000000808121C3A = 90
28440 3F7A47FA8B8A1C00200040 = 38B
28451 00000DF678001DF7F4001D = 3A0
28462 F7EC08120AF41C3BFE7E3F = 50D
28473 7BDE8247FBB4448B8B6838 = 5CB
28484 1C00C0002000600040 0030 = 1CC
28495 00007FD700000DF678001D = 2EE
28506 F7F4001DF7ECFE120AF40E = 607
28517 3BFE7E067BDE8215FBB444 = 5A0
28528 3B8B68384F00C000800060 = 355
28539 0000003000007FD70078CC = 2CA
28550 CCCCCCCCCC783070B03030 = 624
28561 3030FC78FC8C0C3870FCFC = 608
28572 78CC8C38388CCC78808090 = 5A0
28583 90FCFC1010FCFCC0F8FC0C = 760
28594 FCF83C7CC0F8FCCCFC78FC = 89C
28605 FC0C0C183070E078CCCC78 = 534
28616 CCCCCC7878FCCCFC7C0CFC = 79C
28627 F8FCC480FCE4049CFCFC80 = 830
28638 80C0C0C0FCFCFC8484C4C4 = 844
28649 C4FCFCFC8C84C4F8C4C4C4 = 8D0
28660 FC8080F0F0C0FCFCC0C0C0 = 8D4
28671 C0808080FC202020203030 = 41C
28682 3030C4C4C484844C3830FC = 564
28693 E080F0F0809CFC7CCC80F8 = 818
28704 7C04CCF83476EEA1EF843A = 62A
28715 4A26F835F63436A7E2A6A0 = 5CC
28726 A7803A6AE426F7326135B6 = 54A
28737 3476EEA1EF84EEA1EF023A = 666
28748 4A26F435F634368E0FA030 = 466
28759 1F8C000026F935B63476A7 = 406
28770 E2EEA1EF81A6A0A7803A6A = 6F2
28781 E426F3326135F634361703 = 43F
28792 E117006F1703F5867FB701 = 433
28803 5186FFB70155BD8006815E = 505
28814 2602202E13BE6D653088E0 = 3B1
28825 108E6D98860DC62017FF9D = 4CF
28836 308840860C108E6F5417FF = 401
28847 91BF6D658C198025068E19 = 419
28858 60BF6D6535B613BE6D6510 = 48F
28869 8E6D98860DC62017FF7230 = 4C4
28880 88E0860C108E6F2417FF66 = 4A7
28891 BF6D658C088022068E08A0 = 403
28902 BF6D6535B63436B66D7681 = 500
28913 00102700A5C60386021CFE = 347
28924 BE6D671700A930011700A4 = 33E
28935 300117009F4A26EBBE6D67 = 3D4
28946 308820BF6D675A26DD3088 = 480
28957 A0BF6D67F66D725AF76D72 = 638
28968 2671C604F76D72BE6D6730 = 4F9
28979 01BF6D67B66D694CB76D69 = 4F9
28990 BE6D673088E0A684810027 = 4FC
29001 53C60A8E0032BF6D801704 = 3AA
29012 48301F5A26F54FB76D7D10 = 40C
29023 8E6D98BE6D6D8605C61F17 = 4B2
29034 FEC4301F17FEBFBE6D6786 = 5FD
29045 03C62017FEA9861AB76D69 = 4D4
29056 17031117033C1700541700 = 103
29067 5117004E17004BBE6D8A30 = 2FD
29078 8819BF6D8A35B6BE6D6730 = 504
29089 8860A684810026A335B634 = 47B
29100 36E68456E78435B63436F6 = 5AC
29111 6D77C101271EBE6D653089 = 434
29122 0164BF6D67108E6DF18603 = 47D
29133 C62017FE528E001EBF6D80 = 4A5
29144 1703C235B63436C60ABE6D = 42C
29155 883001BF6D885A26F58E1C = 48C
29166 6C108E6D82A6A44C810A27 = 441
29177 13A7A4C6083DC36F841F02 = 440
29188 8608C61F17FE2535B64FA7 = 48E
29199 A43420C6083DC36F841F02 = 3DA
29210 8608C61F17FE0F35203121 = 33E
29221 301F8C1C6826C735B63436 = 3A1
29232 BE6D9410BE6D9810BF6D96 = 564
29243 BF6D9635B63436BE6D92BF = 593
29254 6D9435B63436BE6D90BF6D = 53D
29265 9235B63436BE6D8EBF6D90 = 55C
29276 35B63436BE6D8CBF6D8E35 = 4FB
29287 B6343610BE6D968E05AB9F = 4CE
29298 8817003E10BE6D948E056B = 3AA
29309 9F8817003210BE6D928E05 = 3D0
29320 2B9F8817002610BE6D908E = 3E8
29331 04EB9F8817001A10BE6D8E = 410
29342 8E04AB9F8817000E10BE6D = 3C4
29353 8C8E046B9F8817000235B6 = 3B4
29364 34360F6F1F20BD957A35B6 = 3DE
29375 8601B7FF22867EB7FFC3B7 = 693
29386 FFC5B7FFC78E04008660A7 = 660
29397 808C060026F98E04688671 = 422
29408 A7843088404C817726F68E = 511
29419 0469C606866EA784308840 = 450
29430 5A26F88E040C108E73F5A6 = 4C2
29441 A0A780108C73FA26F68E04 = 57E
29452 25108E73FAA6A0A780108C = 539
29463 740D26F6BE6D88BC6D8C25 = 52A
```

```
29474 1D17FF0817FF1717FF1E17 = 3B3
29485 FF2517FF2CBF6D8C108E04 = 4C0
29496 6B10BF6D6316007ABC6D8E = 451
29507 251A17FEE617FEF517FEFC = 655
29518 17FF03BF6D8E108E04AB10 = 430
29529 BF6D6316005BBC6D901025 = 3EE
29540 001717FEC517FED417FEDB = 5CA
29551 BF6D90108E04EB10BF6D63 = 4E8
29562 16003DBC6D92251317FEA9 = 404
29573 17FEB8BF6D92108E052A10 = 468
29584 BF6D632025BC6D94251017 = 3DD
29595 FE91BF6D94108E056B10BF = 52C
29606 6D632010BC6D96250B108E = 38D
29617 05AB10BF6D63BF6D9617FE = 526
29628 AB8E05E7108E73E5A6A0A7 = 608
29639 80108C73F526F6BD800681 = 564
29650 59102703BB814E10270030 = 284
29661 17003217FC6E20E9414E4F = 3B1
29672 5448455260474F6068596F = 3B9
29683 4E690A0117136002192013 = 19A
29694 1405160520070114080512 = 8F
29705 030F0C058E04009F883436 = 246
29716 BE6D63C60A301DA6848840 = 49D
29727 A7805A26F717017635B634 = 44B
29738 36B6FF238A08B7FF238E00 = 507
29749 0186FDB7FF208D167FFF20 = 59B
29760 8D1130018C00FE25EDB6FF = 520
29771 2384F7B7FF2335B61F1231 = 4C4
29782 3F22FC393436B66D768101 = 41B
29793 270FBD8006810D260817FD = 349
29804 478601B76D7635B63436B6 = 473
29815 6D69811A25154FB76D76B7 = 44B
29826 6D69108E6D98BE6D678603 = 494
29837 C62017FB9235B63436B66D = 502
29848 7D81012723108E6D98BE6D = 417
29859 6D8605C61F17FB85BD978E = 556
29870 F60116C18F2502C68F8620 = 47F
29881 3DC3095EFD6D6D35B63436 = 493
29892 F66D7DC101271CBE6D6D10 = 48D
29903 8E6E5F8605C61F17FB5786 = 4BA
29914 01B76D7DC608F76D745FF7 = 59E
29925 6D7F35B6343613C6051CFE = 439
29936 BE6D6D17009E301F170099 = 34C
29947 BE6D6D308820BF6D6D5A26 = 489
29958 E73089FF60BF6D6DF66D74 = 66F
29969 5AF76D742656C608F76D74 = 554
29980 F66D7F5CF76D7FC1192511 = 531
29991 5FF76D7FF76D7DF66D7E5A = 65E
30002 F76D7E1701A1BE6D6D301F = 482
30013 BF6D6DBD978EF60116C17D = 5C6
30024 2225BE6D6D108E6D988605 = 40D
30035 C61F17FAD83088408C1A5F = 4CB
30046 25033088C0BF6D6D108E6E = 445
30057 5F17FAC335B6BE6D6D108E = 554
30068 6D988605C61F17FAB33088 = 4F1
30079 C08C08DF2203308840BF6D = 47C
30090 6D108E6E5F17FA9E20D934 = 4B4
30101 36E68459E78435B63436B6 = 56F
30112 FF238A08B7FF238E000186 = 4A2
30123 FDB7FF208D167FFF208D11 = 5B2
30134 3001BC6D8025EDB6FF2384 = 548
30145 F7B7FF2335B61F12313F26 = 482
30156 FC39BE6D8A301FBF6D8A8C = 57B
30167 00012204102702F9F66D7E = 33A
30178 C1001027FCD71602B53436 = 402
30189 BE6D79108E6D988605C61F = 4B7
30200 17FA353088E0BF6D798C08 = 517
30211 8022068E164FBF6D79108E = 3DE
30222 6E5F17FA1D17002F35B634 = 360
30233 36BE6D7B108E6D988605C6 = 4D0
30244 1F17FA08308820BF6D7B8C = 443
30255 1A3625068E08B9BF6D7B10 = 381
30266 8E6E5F17F9F017004C35B6 = 4A9
30277 3436BE6D793088DFC607A6 = 518
30288 848100260830882O5A26F4 = 37F
30299 35B6BE6D79108E6D988605 = 4BD
30310 C61F17F9C58E164FBF6D79 = 552
30321 C6068E001EBF6D8017FF21 = 45B
30332 301F17FB5C5A26F2BE6D8A = 4E4
30343 308823BF6D8A20CC3436BE = 4A5
30354 6D7B3088DFC606A6848100 = 4F6
30365 26083088205A26F435B6BE = 423
30376 6D7B108E6D988605C61F17 = 412
30387 F97B8E08B9BF6D7BC60A8E = 5C8
30398 003CBF6D8017FED7301F17 = 43A
30409 FB125A26F2BE6D8A308823 = 50F
30420 BF6D8A20CC3436108E0004 = 3AE
30431 8E1C77C607A68443A78430 = 4B6
30442 015A26F63088198C1D7D25 = 393
30453 EC17FD30313F108C000026 = 362
30464 DEF66D7E86083DC36F841F = 55F
30475 028E1C7D8608C61F17F91A = 3C6
30486 35B6343613C60A86011CFE = 3D9
30497 BE6D6F300317FE6B301F17 = 3B3
30508 FE66301F17FE61301F17FE = 48D
30519 5C301F17FE574A26DFBE6D = 491
30530 6F308820BF6D6F5A26D130 = 463
30541 89FEC0BF6D6FF66D755AF7 = 70B
30552 6D752616C608F76D75BE6D = 4F0
30563 6F301F8D0FF66D715CF76D = 4EE
30574 711702EABF6D6F35B63436 = 464
30585 F66D71C1122510BE6D6F30 = 4A6
30596 1F108E6EC4860AC62017F8 = 474
30607 B135B686F5B7FFC3B7FFC5 = 80B
30618 B7FFC7B6FF2284078AF8B7 = 718
30629 FF228E06004FA7808C1E00 = 3D5
30640 26F88E0600C62086FFA780 = 544
30651 5A26FB3088408C086025EF = 47B
30662 108E6DF78E064B860DC620 = 45A
30673 17F850300231A81A108C6E = 38E
30684 5F26EE8E1C20C62086FFA7 = 54F
30695 805A26F93088408C1DE125 = 4A0
30706 EF108E6FD48E1C628608C6 = 530
30717 1F17F82F30013128108C6F = 2F2
30728 FC26EF8E1C77108E6FFC17 = 552
30739 F81B31283001108C702426 = 2F3
30750 F3108E6F848E1C6817F807 = 4AC
30761 30018C1C6E26F6108E6F9C = 40C
30772 8E1C7D17F7F68E08A8BF6D = 595
30783 6B8E1280BF6D658E164FBF = 4CE
30794 6D798E08B9BF6D7BC604F7 = 59D
30805 6D72C608F76D754FB76D73 = 56C
30816 B76D78B76D71B76D77B76D = 5F0
30827 76B76D69B76D7DB76D7F8E = 5D5
```

```
30838 0000BF6D88BF6D82BF6D84 = 512
30849 BF6D86C608F76D748E00FA = 5E0
30860 BF6D8AC603F76D7E8E00FF = 5EE
30871 BF6D8A8E08A8BF6D6BBE6D = 5B6
30882 6B108E6E648605C61F17F7 = 459
30893 8217F7C317FBA617F83417 = 565
30904 FBBA17F7B717FB9A17F828 = 65D
30915 17FBAE17FBCB17FBF617FC = 6B8
30926 1A17FD1917FD4316FCF6C6 = 56C
30937 01F76D77108E6D98BE6D6D = 517
30948 8605C61F17F745301F17F7 = 420
30959 4017FB36BE6D7B17F73717 = 48A
30970 FB2DBE6D7917F72E17FB24 = 53E
30981 BE6D678603C62017F71530 = 454
30992 0117F71017FB12BE6D6530 = 403
31003 881CBF6D6F108E6EEC860A = 4C7
31014 C62017F716863217FC6D4A = 48C
31025 26FA17FDE2F66D73C10110 = 5BE
31036 27013B1700C21700D7F66D = 38D
31047 7EC1001027F971F66D71C1 = 575
31058 1A270220DC86063402BE6D = 32C
31069 6F108E6D98860AC62017F6 = 495
31080 D8108E6E8B8613C61D17F6 = 4F8
31091 EB17FAB2108E6D9817F6E1 = 63F
31102 108E6EEC860AC62017F6B8 = 533
31113 17FA9D35024A26C8BE6D65 = 4AD
31124 108E6F148608C62017F685 = 427
31135 17F6AF108E6D9817F67B30 = 517
31146 8820BF6D658C1A4025DD8E = 4AF
31157 1280BF6D65F66D7E5AF76D = 5C2
31168 7E17FD15108E6D98BE6D6B = 4E0
31179 8608C61F17F65E861AB76D = 4A2
31190 698604B76D724FB76D76B7 = 529
31201 6D71B76D77B76D78F66D7E = 5F6
31212 C100220316F8CCBE6D6F10 = 46A
31223 8E6D98860CC62017F64016 = 46E
31234 FE903436BE6D6B8C08A822 = 4EC
31245 0CBD8006810D2605C601F7 = 3C6
31256 6D7835B63436F66D78C100 = 4D6
31267 2735BE6D6B108E6D988605 = 420
31278 C61F17F5FD308820BF6D6B = 55D
31289 108E6E6417F5F08C1A0025 = 437
31300 15108E6D988605C61F17F5 = 434
31311 E03088E0BF6D6B4FB76D78 = 5FA
31322 35B63436BE6D6B3001C605 = 3E7
31333 A68481C822083088205A26 = 3F5
31344 F435B6C601F76D7320F7BE = 652
31355 6D6F108E6E698611C62017 = 3E5
31366 F59C170067C664108E003F = 416
31377 10BF6D8017F74517FB025A = 47D
31388 26F7BE6D6F108E6D988613 = 4F3
31399 C62017F59517F97A108E6D = 51C
31410 98BE6D6B8605C61F17F573 = 51D
31421 F66D7E86083DC36F841F02 = 483
31432 8E1C7D8608C61F17F55E17 = 41B
31443 FAC8861AB76D698604B76D = 59D
31454 724FB76D76B76D71B76D77 = 58B
31465 B76D78B76D7316FDA23436 = 552
31476 B6FF238A08B7FF237F0147 = 50A
31487 8E88B8A6808D0A7A014726 = 473
31498 F7B6FF2335B6B40147B7FF = 66C
31509 20108E012C313F26FC3939 = 2EF
```

Changing bases

*Part Four of our machine code series — this month **Jason Orbaum** looks at Numerology*

HELLO, and welcome to Part Four of the series that looks set to make 'War and Peace' look like a pamphlet. And there is something very different about this month's tutorial . . . Yes, I'm writing it in the first person singular. There's a very good reason for this:

About three weeks ago Geoffrey came into my room at about eight o'clock and said: "I hope you don't mind Jason, I used your toothbrush."

"I'm sorry Geoffrey," I replied, "but I do object actually because you have plaque and gum disease and lots of other horrible things like that."

"That's all right," he said, "I used it to clean my shoes."

Suffice is to say that Geoffrey is now seeking new accommodation. But will return in a conditional branch next issue!

And so to work. Firstly an apology. We promised "a complete explanation of the assembler directives, full coverage of addressing modes and a tutorial on the branch instructions," last month, but in fact these things will follow in later articles. This month there are some more important things which it occurs to me need explanation, namely, base numerology (as promised) memory organisation, and the precise meaning of single and double precision.

Numbers

Firstly then, base numerology. The way I intend to teach it is the way I myself was taught. Although the next few paragraphs may appear patronising and an insult to the intellect, they are written assuming a total lack of mathematical knowledge, as base numerology simply must be understood if machine code programming is to be achieved with ease (it is quite possible to program in decimal only, but what about reading dis-assembled code or writing in a way where the numbers actually mean something)?

The base numerology lesson runs thus:

1) We live on a planet where the dominant species is the human being. Humans in general have ten fingers. Therefore, the best counting system to use is one which works in multiples of ten; one in base ten (known as decimal).

2) We therefore have ten digits (zero to nine) which can be used to describe any real, rational, non-infinite number.

3) A number is arranged in columns each of which stands for a multiple, or to be more precise, a POWER of ten. The powers of ten are more clearly explained in the following 'table'.

10^0: Ten to the power zero: 1=1
10^1: Ten to the (power) one: 1.10=10
10^2: Ten squared: 1.10.10=100
10^3: Ten cubed: 1.10.10.10=1000
10^4: Ten to the four: 1.10.10.10.10=10000
10^5: Ten to the five: 1.10.10.10.10.10=100000

and so on up until ten to the power infinity which is a number too big to represent! (NB in this table the dot represents a multiplier, ie, 10.10 = 10 × 10 = 100.

We can see that to write ten to the power 'X' where X is any number between zero and infinity we simply write a one with X number of zeros after it. Very simple really! So what use is it?

4) Any number can be written in word form in three standard ways, which are the ways the number can be spoken. Thus the number 12 can be written as "twelve" or "one lot of ten and two units" or "one lot of ten to the power one and two lots of ten to the power zero". The last is both the most useful and the most appropriate to base numerology of the three. The reasons for this require demonstration thus:

Demo

Take this number: 1159395129. It can be expressed in each of the three ways:
A) "One thousand one hundred and fifty nine million three hundred and ninety five thousand one hundred and twenty nine."
B) "One lot of a thousand million, one lot of a hundred million, five lots of ten million, nine lots of a million, three lots of a hundred thousand, nine lots of ten thousand, five lots of a thousand, one lot of a hundred, two lots of ten and nine units."
C) "One lot of ten to the nine, one lot of ten to the eight, five lots of ten to the seven, nine lots of ten to the six, three lots of ten to the five, nine lots of ten to the four, five lots of ten to the three, one lot of ten to the two, two lots of ten to the one and nine lots of ten to the zero."

Description (C) can be re-written in figures thus: $1159395129=1.10^9+1.10^8+5.10^7+9.10^6+3.10^5+9.10^4+5.10^3+1.10^2+2.10^1+9.10^0$

It is arguable which of the word descriptions are easiest to get to from the original number, but it is obvious which word description is easiest to reach the number from.

5) Let us now imagine a planet where the dominant race is a species with only eight fingers. The best system for them to use would be one that works in multiples of eight. The base eight system (known as octal). This system has eight digits (zero to seven) and any real, rational, non-infinite number can be represented within it.

6) Every octal number is arranged in columns each of which stands for a power of eight thus:

8^0: Eight to the zero: 1
8^1: Eight to the one: 1.8=8
8^2: Eight squared: 1.8.8=64
8^3: Eight cubed: 1.8.8.8=512
8^4: Eight to the four: 1.8.8.8.8=4096
8^5: Eight to the five: 1.8.8.8.8.8=32768

and so on up to eight to the power infinity which again is a number too big to be written down.

7) Any number in octal can be written down in words in one of three ways, again these are the ways the number can be spoken. Thus the number 12_8 where the subscript represents the base can be written as "One two base eight", or "One lot of eight and two lots of units", or "One lot of eight to the power one and two lots of eight to the power zero."

The advantage of the last method must again be shown by example: 347621_8
A) "Three four seven six two one base eight."
B) "Three lots of thirty two thousand seven hundred and sixty eight, four lots of four

Conversions from Binary to Decimal

Pick a number. Any number. Say 11010110 binary.
To convert this to decimal, we make use of the fact that, working right to left, each digit represents rising powers of two.
Therefore our binary number is:
$(0\times2^0)+(1\times2^1)+(1\times2^2)+(0\times2^3)+(1\times2^4)+(0\times2^5)+(1\times2^6)+(1\times2^7)$
We can disregard all zero digits, giving:
$(1\times2^1)+(1\times2^2)+(1\times2^4)+(1\times2^6)+(1\times2^7)$
Multiplying out the powers of two gives:
$(1\times2)+(1\times4)+(1\times16)+(1\times64)+(1\times128)$
or
$2 + 4 + 16 + 64 + 128 = 214$
The powers of two are 1,2,4,8,16,32,64,128 and so on, so it becomes fairly easy, with practice, to scan a binary number and work it out on the go.

Conversions from Hex to Decimal

The principle here is the same as for binary, except that we are using powers of sixteen:
$9C = $(9 \times 16^1)+(12 \times 16^0) = 144 + 12 = 156$

thousand and ninety six, seven lots of five hundred and twelve, six lots of sixty four, two lots of eight and one unit."

C) "Three lots of eight to the five, Four lots of eight to the four, Seven lots of eight to the three, Six lots of eight to the two, Two lots of eight to the one and One lot of eight to the zero."

Provided we can work out powers we can easily convert from version (C) to version (B), and from there to decimal. The maths would look like this:

$347621_8 = 3.8^5+4.8^4+7.8^3+6.8^2+2.8^1 +1.8^0$
$= 3.32768+4.4096+7.512+6.64+2.8+1.1$
$= 98304+16384+3584+384+16+1$
$= 128673_{10}$

The ten subscript can be dropped, as any number without a subscript is assumed to be in base ten in mathematics.

From here we can generalise:

8) Let us imagine a planet where the dominant species is a creature with Q fingers (where Q is any positive whole number above one). Here, the simplest system of counting to use would be one that works in multiples of Q. The base Q system. There are Q digits (zero to Q−1).

9) The numbers in base Q are presented in columns each of which represents a power of Q. The powers are calculated thus:

Q^0: Q to the zero: 1
Q^1: Q to the one: 1.Q=Q
Q^2: Q squared (or Q to the two): 1.Q.Q
Q^3: Q cubed (or Q to the three): 1.Q.Q.Q
Q^4: Q to the four: 1.Q.Q.Q.Q

and so on up to Q to the power infinity which is a number too big to be written down.

Any number in Base Q can be written in two ways; thus 12_Q can be written "One two base Q" or "One lot of Q to the one and two lots of Q to the zero"

10) To convert from base Q to decimal the maths is worked out thus:

123411_Q
$=1.Q^5+2.Q^4+3.Q^3+4.Q^2+1.Q^1+1.Q^0$
$=1.1.Q.Q.Q.Q.Q + 2.1.Q.Q.Q.Q + 3.1.Q.Q.Q + 4.1.Q.Q + 1.1.Q + 1.1$
$=1.Q.Q.Q.Q.Q. + 2.Q.Q.Q.Q + 3.Q.Q.Q + 4.Q.Q. + 1.Q + 1$

We cannot continue from here satisfactorily without knowing what Q is.

Lesson

Thus endeth the lesson in Pure base numerology. Now comes its application. Fortunately when computing we need not work in terms of a base of an unknown constant (ie Base Q) but using the structure of the constant enables us to work in any given base. The two bases most commonly used in computing are Binary (base 2) and Hexadecimal (Base 16).

Binary is used because this is the base that a computer "works" in. As has been explained before a computer circuit can be in one of two states at any given time. It can either be on or off. These states are represented mathematically by the digits 1 and 0. Thus, when designing a picture in PMODE 4,1 any particular pixel can be black or white (or green in SCREEN 1,0). Thus if we take eight pixels which are alternatively on and then off a binary representation of them would be:

$10101010_2 = 170$

(The number is represented to the assembler by use of the Prefix '%' which tells the assembler that the next number is in binary, ie %10101010)

And by an amazing non-coincidence, to produce this exact pattern in the top left of the screen in this mode we simply POKE location 1024 with 170. More of this much later when we come onto graphics. Base two is used also for mathematical work as we shall see in two months' time.

Hexadecimal uses sixteen digits they are, in ascending order, 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F. Thus a hex (short for hexadecimal) number can look like this: $3AB2_{16}$

or, in assembler language, $3AB2 with the dollar sign (on Encoder at least) telling the assembler that the next number is in hex. The reason we program in hex is that it is very easy to convert from binary to hex, and hex is easier to use when visualising patterns. Conversion from Binary to hex is incredibly easy, all that is needed is the following table:

Decimal	Binary	Hex
1	0001	1
2	0010	2
3	0011	3
4	0100	4
5	0101	5
6	0110	6
7	0111	7
8	1000	8
9	1001	9
10	1010	A
11	1011	B
12	1100	C
13	1101	D
14	1110	E
15	1111	F

It is clear that %1111 is the highest number possible with four binary digits, or bits (a nybble, remember?) and that $F is the highest number possible with a single hex digit. Thus a byte, composed of eight bits can always be represented by two hex digits. To convert is simplicity itself. Simply split the Binary number into groups of four adding zeros to the beginning of the highest cluster thus:

a) %101101 splits to %0010 and %1101
%0010 = $2
%1101 = $D
thus %101101 = $2D

b) %10111011011001 splits to %0010, %1110, %1101 and %1001
%0010 = $2
%1110 = $E
%1101 = $D
%1001 = $9
Thus %10111011011001 = $2ED9

This leads us rather neatly into single and double precision. They are now very easy to explain. Simply, a single precision number can be held in one byte and thus represented by up to eight digits in binary (up to two digits in hex) and a double precision number can be represented by between nine and sixteen digits in binary and either three or four digits in hex.

And so, finally, to the organisation of memory which must be visualised to enable skilled programming. Basically, we can think of memory as a long long line of boxes placed next to each other (yes, I know it's a cliche, but why do you think it's a cliche — because it's a very good description!)

Each of these boxes can hold a single precision number, ie an integer between %0 and %11111111 or $0 and $FF or 0 and 255 inclusive. In the Dragon there are %1111111111111111 or $FFFF or 65536 boxes although half of them (from 32768 onwards) have been locked with a set number inside that cannot be changed — they are in ROM. The first 32768 (from 0-32767) can have the number within them changed at any time by the programmer.

0-3FF	Systems Use
0FF	Direct Page RAM
3FF	Extended Page RAM
400-5FF	Text Screen Memory
600-35FF	Graphics Screen Memory
3600-7FFF	Program & Variable Storage
8000-8FFF	Basic Interpreter
C000-FEFF	Cartridge Memory
FF00-FF5F	Input/Output
FF60-FFDF	SAM Control Bits
FFE0-FFFF	MPU Vectors

If a double precision number is stored at a location the high byte (the first eight binary digits when zeros have been added on to the front make the number of binary digits up to sixteen and hex digits up to four) is stored at that location and the low byte (the remaining eight binary digits or two hex digits) in the next location.

Eg, to store %1110001110 ($38E) in location 1024, location 1024 will contain %00000011 ($03) and location 1025 will contain %10001110 ($8E)

Revision

I hope that this month's article (which has diverted somewhat from the practical course!) has helped to clear up any problems that existed about the basics of programming. From here onwards all the terminology used in this tutorial will be assumed understood and used frequently without explanation in future parts. To briefly run down what has been assumed understood: Base notation in mathematical and assembler form, the exponential or power theory, single and double precision numbers, Memory arrangement, Mathematical notation for multiplication, conversion from any base into decimal, conversion from Hex to Binary and vice versa. Got that!?

Next month, an explanation of the Branch instructions and an introduction to dry running. If there is anything you do not understand that has been covered please write to the usual Dragon User address, and maybe I can help.

I must go now, there's someone at the door about renting Geoffrey's room!

Graphic Display

Printing text on the graphics screen — all is revealed by ***Peter Whittaker***

FOR A long time I have been bored with the Dragon's black on green display, and so eventually got around to doing something about it. I wanted to write a routine which would allow printing on both the usual green text screen, and the orange alternative screen. It also had to print text to the PMODE4,1 graphics screen, in a variety of different ways, to allow the mixing of text and graphics. Lastly, it was not to interfere with the normal running of the computer, so that tape and printer operations would still function normally.

The end result was 'Graftext', which resides in memory from 29000. This program will intercept the Dragon's print routine and replace it with its own. This means that all text messages can be displayed on the graphics screen, and not just deliberately printed strings.

Graphics

There is no need to display the text screen for anything at all. The Dragon becomes a true graphics machine, with error messages and loading program titles being displayed on the graphics screen. It is even possible to program the Dragon from the graphics screen!

First, CLEAR 200, 29000, then Enter and RUN the loader program (Listing # 1) and then type in the code for 'Graftext'. When this has been saved to tape, EXEC 29000 to install the routine. The screen will switch to graphics, and display the Copyright message. The CLS command and the <CLEAR> key have been redirected to also PCLS the graphics screen. The routine is completely transparent to Dragon Basic.

To change the display screen just use the SCREEN command (SCREEN1,0 or SCREEN0,1 etc). Another noticeable feature is that the graphics screen can be displayed by a simple SCREEN1,0 command. The display does *not* revert to the text screen when the computer prints its 'OK' prompt.

There are several special functions written into Graftext to give greater control over the printout. These are all called from the PRINT CHR$(–) command. (Table #1 gives a full list.)

CHR$(0) — disconnects the routine. The program still remains in memory, and can be recalled by EXEC29000, but will not interfere if other routines want to be run (eg, DASM assembler cartridge).

CHR$(1) — stops the routine from printing on the graphics screen. Text will still be displayed on the text screen, and commands can still be entered from the keyboard, but they will not be listed on the graphics screen. This will stop the computer from printing ugly messages over great works of art on the graphics display.

CHR$(2) — reconnects the graphics print routine.

CHR$(3) — turns the graphics screen scroll routine off. Text will be printed down the screen as usual, but when the bottom line is reached, the screen will not scroll and the bottom line will be overprinted again and again.

CHR$(4) — reconnects the scroll routine.

CHR$(5) — causes the print to be ORed with the background before printing. Text will be white on black or white on white (invisible). When printing in this mode, text will not destroy the graphics it prints over.

CHR$(6) — causes the print to delete its background when printed. Any graphics will be rubbed out. Print is again white on black, but if the background is white the text will still be white in a black surround. Graphics can of course be drawn over this text once printed.

CHR$(7) — will cause the text to be EORed with its background before printing.

0	-	DISCONNECT
1	-	PRINT OFF
2	-	PRINT ON
3	-	SCROLL OFF
4	-	SCROLL ON
5	-	PRINT 'OR'
6	-	PRINT !!
7	-	PRINT 'EOR'
14	-	SET WHITE BACKGROUND
15	-	SET BLACK BACKGROUND

Table 1

This has the effect of producing a white print on a black background, or a black text on a white background. Any underlying graphics are not destroyed.

CHR$(8) — still the code for a backspace.

CHR$(14) — changes the background colour from black to white. It also recolours the backspace, the CLS command and the scroll routine. It will also select the EOR text of CHR$(7) so that the print can be seen on the white background.

CHR$(15) — reselects the standard black background, undoing the effects of the CHR$(14). However, it does not change the print type (5-7).

'Graftext' comes complete with its own predefined graphics character set. These can be redefined by POKEing the appropriate codes into memory. Listing #2 is a program to do just that. When run, the program will display the letter 'R' and wait for a prompt. Pressing the <Shift> key with either the up or down arrow key will cause the program to display the next letter above or below. In this way the whole character set can be examined at leisure. To find a letter quickly, press the <L> key, and the program will then ask which letter to display. Pressing the <#> key will allow you to select a character by its ASCII code (eg, 65=A, 66=B, etc). Pressing the <Q> will quit the program.

When the program runs it displays each graphics character in a large grid to the left of the screen. If the character is not the desired shape, press the <*> key to redefine it. The computer will then prompt for 12 string inputs on the right hand side of the screen, opposite the graphics character. Each input should be eight characters long, and be comprised of a series of ones

```
10 'HEX LOADER FOR 'GRAFTEXT' MEMOR
   Y DUMP. BY PETER WHITTAKER
20 START = 29000
30 FINISH = 32380
40 FOR N=START TO FINISH STEP 8
50 PRINT N;": ";
60 TT=0:INPUT A$:Z=0
70 FOR M=1 TO LEN(A$) STEP2
80 L=VAL("&H"+MID$(A$,M,2))
90 TT=TT+L:POKEN+Z,L
100 Z=Z+1:NEXT M
110 PRINT" = ";
120 INPUT T
130 IF T<>TT THEN PRINT"error - ENT
   ER LINE AGAIN":GOTO50
140 NEXT N
```

Listing 1

```
LISTING #2.
DESIGNER PROG.
10 PMODE4,1
20 ALPHABET=29307
30 CHR=65
40 PRINTCHR$(6):CLS
50 PRINT@7,"Character Definer"
60 PRINT" CHARCTER  CODES  =";CHR$
    (CHR);" =";CHR
70 CODE=CH*12+ALPHABET
80 PRINT@113,"SHIFT/UP...NEXT"
90 PRINT@145,"SHF/DOWN...PREV"
100 PRINT@177,"L...PICK LETTER"
110 PRINT@209,"#...PICK CODE"
120 PRINT@241,"S...SAVE CODES"
130 PRINT@273,"*...CHANGE CODE"
140 PRINT@305,"Q...QUIT PROG"
150 FOR A=0 TO 11
160 B=PEEK(CODE+A)
170 PRINT@65+(A*32),"";
180 C=256
190 FOR D=1 TO 8
200 C=C/2
210 GOSUB480
220 NEXT D
230 B=PEEK(CODE+A)
240 PRINT"    ";B
250 NEXT A
260 FOR L1=8 TO 72 STEP8:LINE(L1,24
    )-(L1,168),PSET:NEXT
270 FOR L2=24 TO 168 STEP 12:LINE(8
    ,L2)-(72,L2),PSET:NEXT
280 PRINT@481,"ADDRESS  = ";CODE;
290 A$=INKEY$:IF A$="" THEN 290
300 IF A$="Q" THEN STOP
310 IF A$="_" THEN CLS:CH=CH+1:IF C
    H>255 THEN CH=32:GOTO40 ELSE GO
    TO40
320 IF A$="[" THEN CLS:CH=CH-1:IF C
    H<32 THEN CH=255:GOTO40 ELSE GO
    TO40
330 IF A$="L" THEN INPUT"WHICH LETT
    ER";A$:CH=ASC(A$):GOTO40
340 IF A$="#" THEN INPUT"WHICH CHAR
    ACTER CODE";CH:IF CH>255 OR CH<
    32 THEN 340 ELSE GOTO40
350 IF A$="S" THEN CLS:PRINT"READY
    CASSETTE TO SAVE":INPUT"ENTER A
    LPHABET TITLE";A$:CSAVEMA$,ALPH
    ABET+32*12,ALPHABET+256*12,4119
    4:GOTO40
360 IF A$<>"*" THEN 290
361 FOR A=0 TO 7:PRINT@113+A*32,STR
    ING$(15,32):NEXT
370 FOR A=0 TO 11
380 PRINT@84+A*32,STRING$(12,128);:
    PRINT@84+A*32,"";
390 INPUT A$:E=0
400 IF LEN(A$)<>8 THEN 380
410 C=256:FOR D=1 TO 8
420 C=C/2
430 IF MID$(A$,D,1)="1" THEN E=E+C
440 NEXT D
450 POKE CODE+A,E
460 NEXT A
470 GOTO 40
480 IFB>=C THEN B=B-C:PRINTCHR$(143
    );:RETURN ELSE PRINTCHR$(128);:
    RETURN
490 '(C) 1986 BY PETER WHITTAKER.
```

and zeros. (The ones will select a white pixel in the graphics character, whilst a zero will select a black pixel.) If the input is longer or shorter than eight characters, the computer will ask you to re-enter it. When all 12 lines of the character code have been entered, the computer will redisplay the new graphics character. In this way the whole character set can be redesigned to taste.

'Graftext' can be resaved to tape with the new character set, by CSAVEM"GRAFTEXT", 29000, 32765, 29000. Alternatively, pressing the <S> key will save the character set alone. Several character sets can be saved separately, and then reloaded for use as desired, without interrupting the functions of 'Graftext'.

Modification

At the moment, 'Graftext' will print out characters from CHR$(32) to CHR$(255). The Graphics blocks from CHR$(144) to CHR$(255) are identical in shape to the earlier blocks, and so can be redefined as new shapes (eg, space invaders, missiles, bombs, etc). However, if you want to, you can restore the normal graphics blocks by a simple POKE&H733C,&H25. This will check the value of each character before it is printed. If it is greater than CHR$(143) then 16 is subtracted until it is low enough to print. The only noticeable difference will be on the text screen, where all the graphics blocks will be the one colour (CHR$(128)–(143)). On the graphics screen there is only one colour anyway. The full character set can be restored by POKE&H733C,&H20.

The routine is set up to work on the PMODE4,1 screen, but will also work quite well on the PMODE3,1 screen. The character set will appear as a mix of colours, and so will need to be redefined to take account of the two-bit wide pixels of the colour graphics modes. The display can also be set to PMODE2,3 or PMODE0,4, but care will be needed. These two resolutions are only 16 bytes wide, and not the full 32 of the PMODE4 screen. As a result text will be printed twice on each line if a full 32 characters are printed. Keep each line of print to 16 characters or less, and the display will be okay.

Because the routine prints out its characters on a 32-bit line, each line of print will take 24 lines of the screen, and each line of a graphics character will be separated by a blank line. This can be solved by POKE&H739A,16 which squashes the display back to 12 lines. POKE&H739A,32 to restore the print to PMODE4/3 use.

The scroll routine EXEC &H73A3 stores the background colour at location &H73B2/3. The PCLS colour code is stored at location &H73CC. The Backspace colour is stored at &H731C. These codes can be altered from Basic, but will be changed whenever a CHR$(14) or CHR$(15) is printed to the screen. It is not easily possible to modify the routine to work with the disc drive attached.

If you do not fancy typing in the whole program, I can supply a copy on tape. Send a cheque for £3.00 to Peter Whittaker, 96 Upper Holly Walk, Leamington Spa, Warwickshire CV32 4JP. Finally, remember to CLEAR 200,29000 before reloading 'Graftext'!!

```
29000 :CC720EFD0168CC73= 1009
29008 :BCFD016BCC73C4FD= 1317
29016 :01A1867EB70167B7= 892
29024 :016AB701A08E0600= 599
29032 :4FA7808C1E0025F9= 830
29040 :86FEB7FF22B7FFC7= 1497
29048 :B7FFC5B7FFC38E04= 1414
29056 :00BF00888E718ABD= 909
29064 :90E5392843292031= 659
29072 :3938322044524147= 481
29080 :4F4E204441544120= 503
29088 :4C54440D31364B20= 451
29096 :424153494320494E= 537
29104 :5445525052455445= 619
29112 :5220312E300D2843= 377
29120 :2920313938322042= 383
29128 :59204D4943524F53= 582
29136 :4F46540D47524146= 534
29144 :5445585420424153= 571
29152 :494320455854454E= 560
29160 :53494F4E20312E30= 498
29168 :0D28432920313938= 355
```

```
29176 :3620425920504554= 506
29184 :4552205748495454= 583
29192 :414B45520D003402= 358
29200 :B6006F2703350239= 447
29208 :350281012614867E= 503
29216 :B772E534108E7331= 900
29224 :BF72E63510860132= 789
29232 :6239810226148681= 507
29240 :B772E58608B772E6= 1195
29248 :8626B772E7860332= 887
29256 :6239810326088639= 524
29264 :B773A33262398104= 799
29272 :2608868EB773A332= 833
29280 :62398105260F86AA= 646
29288 :B773948684B77395= 1159
29296 :6605326239810626= 517
29304 :0D6612B77394B773= 909
29312 :9586063262398107= 630
29320 :260F86A8B7739486= 935
29328 :84B7739586073262= 868
29336 :398100260D8639B7= 611
29344 :0167B7016AB701A0= 738
29352 :4F39810E2614868F= 614
29360 :B7731C86FFB773B2= 1191
29368 :B773B3B773CC8607= 1120
29376 :20C4810F26138680= 691
29384 :B7731C8600B773CC= 962
29392 :B773B2B773B33262= 1101
29400 :3932623436BE0088= 637
29408 :3410BD800C810826= 572
29416 :398E008830018F02= 623
29424 :88BE73940F73208E= 1069
29432 :1212BF7394351035= 612
29440 :36BD731734108E00= 639
29448 :88301FBF0088BE73= 847
29456 :20BF739435103934= 664
29464 :36341086207E7322= 563
29472 :1212810D2610BE00= 422
29480 :886C05E02503BD73= 849
29488 :A335103536398120= 557
29496 :25F7819020048010= 737
29504 :25F4351034108C05= 563
29512 :FF250734368D73A3= 872
29520 :35363402FC008883= 680
29528 :0001475654545454= 494
29536 :C40F860C3D108E00= 576
29544 :208E00003A313F10= 360
29552 :8C000026F71F10C3= 667
29560 :06001F01FC008883= 557
29568 :00014FC41F3A3502= 420
29576 :C60C3DC3727B1F02= 736
29584 :C60CA6A01212A784= 871
29592 :3088205A26F43510= 657
29600 :3536398E0600EC89= 685
29608 :0180ED818C1C8025= 828
29616 :F5CC0000ED818C1E= 985
29624 :0025F939810C261A= 548
29632 :3413200734138C81= 450
29640 :94260C86008E0600= 480
29648 :A7808C1E0025F935= 804
29656 :13398109260B866D= 596
29664 :B072DBB772DB8609= 1168
29672 :39810A260B86C7B0= 754
29680 :73A3B773A3860A39= 940
29688 :3900000000000000= 57
29696 :0000000000000008= 8
29704 :0808080800000800= 40
29712 :0000001414140000= 60
29720 :0000000000000014= 20
29728 :143E14143E141400= 224
29736 :00000000083E283E= 172
29744 :0A3E080000000000= 80
29752 :3032040810260600= 170
29760 :0000000010282810= 112
29768 :2A241A0000000008= 112
29776 :0810000000000000= 24
29784 :0000000008102020= 88
29792 :2020100800000000= 88
29800 :0804020202020408= 32
29808 :0000000000082A1C= 78
29816 :081C2A0800000000= 86
29824 :000008083E080800= 94
29832 :0000000000000000= 0
29840 :0000080810200000= 64
29848 :0000003E00000000= 62
29856 :0000000000000000= 0
29864 :0000181800000000= 48
29872 :0001020408102040= 127
29880 :000000001C22262A= 142
29888 :2A32221C00000000= 154
29896 :081808080808081C= 100
29904 :000000001C220204= 68
29912 :0810203F00000000= 119
29920 :1C22020C0202221C= 142
29928 :00000000040C1424= 72
29936 :3F04040400000000= 75
29944 :3E20203C0202221C= 252
29952 :000000000E10203C= 122
29960 :2222221C00000000= 130
29968 :3F02040810101010= 141
29976 :000000001C22221C= 124
29984 :2222221C00000000= 130
29992 :1C22221C02020438= 188
30000 :0000000000000800= 8
30008 :0008000000000000= 8
30016 :0000000800000808= 24
30024 :1020000004081020= 108
30032 :1008040000000000= 28
30040 :00003F00003F0000= 126
30048 :0000000010080402= 30
30056 :0408100000000000= 28
30064 :1C22220408080008= 124
30072 :000000001C22222A= 138
30080 :2E2C201E00000000= 152
30088 :1C22223E22222222= 294
30096 :000000003C22223C= 188
30104 :2222223C00000000= 162
30112 :1C2220202020221C= 252
30120 :0000000038242222= 160
30128 :2222243800000000= 160
30136 :3E20203C2020203E= 344
30144 :000000003E20203C= 186
30152 :2020202000000000= 128
30160 :1E2020202722221C= 261
30168 :000000002222223E= 164
30176 :2222222200000000= 136
30184 :1C0808080808081C= 104
30192 :0000000002020202= 8
```

```
30200 :0222221C00000000= 98
30208 :2224283028242222= 302
30216 :0000000020202020= 128
30224 :2020203F00000000= 159
30232 :22362A2A2A222222= 316
30240 :000000002222322A= 160
30248 :2A26222200000000= 148
30256 :1C2222222222221C= 260
30264 :000000003C22223C= 188
30272 :2020202000000000= 128
30280 :1C222222322A241A= 284
30288 :000000003C222222= 162
30296 :3C28242200000000= 170
30304 :1C22201C0202221C= 188
30312 :000000003F080808= 87
30320 :0808080800000000= 32
30328 :222222222222221C= 266
30336 :0000000022222214= 122
30344 :1414080800000000= 56
30352 :2222222A2A362222= 308
30360 :0000000022221408= 96
30368 :0814222200000000= 96
30376 :2222140808080808= 128
30384 :000000003F020408= 77
30392 :1020203F00000000= 143
30400 :3E3030303030303E= 412
30408 :0000000000002010= 48
30416 :0804020000000000= 14
30424 :3E0606060606063E= 160
30432 :0000000008142200= 62
30440 :0000000000000000= 0
30448 :000000000000003E= 62
30456 :0000000000100804= 28
30464 :0000000000000000= 0
30472 :00001C041C24241A= 158
30480 :000000002020202C= 140
30488 :2222223C00000000= 162
30496 :0000001E2020201E= 156
30504 :000000000202021A= 32
30512 :2622221E00000000= 136
30520 :0000001C223C201C= 182
30528 :00000000000C1210= 46
30536 :3810101000000000= 104
30544 :0000001C22221E02= 128
30552 :02021C002020202C= 172
30560 :3222222200000000= 152
30568 :000800180808081C= 84
30576 :0000000000000004= 4
30584 :0004040404140800= 44
30592 :0020202428302824= 264
30600 :0000000000180808= 40
30608 :0808080C00000000= 36
30616 :000000342A2A2A22= 212
30624 :000000000000002C= 44
30632 :1212121200000000= 72
30640 :0000001C2222221C= 158
30648 :0000000000000038= 56
30656 :2424243820202000= 260
30664 :0000001C2424241C= 164
30672 :040406000000002C= 58
30680 :3220202000000000= 146
30688 :0000001C201C023C= 150
30696 :000000000010103C= 92
30704 :1010120C00000000= 62
30712 :000000242424241A= 170
30720 :0000000000000022= 34
30728 :2214140800000000= 82
30736 :00000022222A2A14= 172
30744 :0000000000000022= 34
30752 :1408142200000000= 82
30760 :000000242424241C= 172
30768 :04041C000000003E= 98
30776 :0408103E00000000= 90
30784 :0004080810080804= 56
30792 :0000000000080808= 24
30800 :0008080800000000= 24
30808 :0010080804080810= 68
30816 :000000000000122C= 62
30824 :0000000000000000= 0
30832 :0000000000000000= 0
30840 :0000000000000000= 0
30848 :0000000000000000= 0
30856 :00000000000F0F0F= 45
30864 :0F0F0F0000000000= 45
30872 :00F0F0F0F0F0F000= 1440
30880 :0000000000FFFFFF= 765
30888 :FFFFFF0F0F0F0F0F= 840
30896 :0F0000000000000F= 30
30904 :0F0F0F0F0F0F0F0F= 120
30912 :0F0F0F0F0F0F0F0F= 120
30920 :0FF0F0F0F0F0F00F= 1470
30928 :0F0F0F0F0FFFFFFF= 840
30936 :FFFFFFF0F0F0F0F0= 1965
30944 :F0000000000000F0= 480
30952 :F0F0F0F0F00F0F0F= 1245
30960 :0F0F0FF0F0F0F0F0= 1245
30968 :F0F0F0F0F0F0F0F0= 1920
30976 :F0F0F0F0F0FFFFFF= 1965
30984 :FFFFFFFFFFFFFFFF= 2040
30992 :FF000000000000FF= 510
31000 :FFFFFFFFFF0F0F0F= 1320
31008 :0F0F0FFFFFFFFFFF= 1320
31016 :FFF0F0F0F0F0F0FF= 1950
31024 :FFFFFFFFFFFFFFFF= 2040
31032 :FFFFFF0000000000= 765
31040 :0000000000000000= 0
31048 :00000000000F0F0F= 45
31056 :0F0F0F0000000000= 45
31064 :00F0F0F0F0F0F000= 1440
31072 :0000000000FFFFFF= 765
31080 :FFFFFF0F0F0F0F0F= 840
31088 :0F0000000000000F= 30
31096 :0F0F0F0F0F0F0F0F= 120
31104 :0F0F0F0F0F0F0F0F= 120
31112 :0FF0F0F0F0F0F00F= 1470
31120 :0F0F0F0F0FFFFFFF= 840
31128 :FFFFFFF0F0F0F0F0= 1965
31136 :F0000000000000F0= 480
31144 :F0F0F0F0F00F0F0F= 1245
31152 :0F0F0FF0F0F0F0F0= 1245
31160 :F0F0F0F0F0F0F0F0= 1920
31168 :F0F0F0F0F0FFFFFF= 1965
31176 :FFFFFFFFFFFFFFFF= 2040
31184 :FF000000000000FF= 510
31192 :FFFFFFFFFF0F0F0F= 1320
31200 :0F0F0FFFFFFFFFFF= 1320
31208 :FFF0F0F0F0F0F0FF= 1950
31216 :FFFFFFFFFFFFFFFF= 2040
31224 :FFFFFF0000000000= 765
31232 :0000000000000000= 0
31240 :00000000000F0F0F= 45
31248 :0F0F0F0000000000= 45
```

```
31256 :00F0F0F0F0F0F000= 1440
31264 :000000000000FFFFFF= 765
31272 :FFFFFFF0F0F0F0F0F= 840
31280 :0F00000000000000F= 30
31288 :0F0F0F0F0F0F0F0F= 120
31296 :0F0F0F0F0F0F0F0F= 120
31304 :0FF0F0F0F0F0F00F= 1470
31312 :0F0F0F0F0FFFFFFFF= 840
31320 :FFFFFFFF0F0F0F0F0= 1965
31328 :F00000000000000F0= 480
31336 :F0F0F0F0F00F0F0F= 1245
31344 :0F0F0FF0F0F0F0F0= 1245
31352 :F0F0F0F0F0F0F0F0= 1920
31360 :F0F0F0F0F0FFFFFFF= 1965
31368 :FFFFFFFFFFFFFFFF= 2040
31376 :FF000000000000FF= 510
31384 :FFFFFFFFFFF0F0F0F= 1320
31392 :0F0F0FFFFFFFFFFFF= 1320
31400 :FFF0F0F0F0F0F0FF= 1950
31408 :FFFFFFFFFFFFFFFF= 2040
31416 :FFFFFF0000000000= 765
31424 :0000000000000000= 0
31432 :0000000000F0F0F= 45
31440 :0F0F0F0000000000= 45
31448 :00F0F0F0F0F0F000= 1440
31456 :0000000000FFFFFF= 765
31464 :FFFFFF0F0F0F0F0F= 840
31472 :0F00000000000000F= 30
31480 :0F0F0F0F0F0F0F0F= 120
31488 :0F0F0F0F0F0F0F0F= 120
31496 :0FF0F0F0F0F0F00F= 1470
31504 :0F0F0F0F0FFFFFFF= 840
31512 :FFFFFFF0F0F0F0F0= 1965
31520 :F00000000000000F0= 480
31528 :F0F0F0F0F00F0F0F= 1245
31536 :0F0F0FF0F0F0F0F0= 1245
31544 :F0F0F0F0F0F0F0F0= 1920
31552 :F0F0F0F0F0FFFFFF= 1965
31560 :FFFFFFFFFFFFFFFF= 2040
31568 :FF000000000000FF= 510
31576 :FFFFFFFFFF0F0F0F= 1320
31584 :0F0F0FFFFFFFFFFF= 1320
31592 :FFF0F0F0F0F0F0FF= 1950
31600 :FFFFFFFFFFFFFFFF= 2040
31608 :FFFFFF0000000000= 765
31616 :0000000000000000= 0
31624 :0000000000F0F0F= 45
31632 :0F0F0F0000000000= 45
31640 :00F0F0F0F0F0F000= 1440
31648 :0000000000FFFFFF= 765
31656 :FFFFFF0F0F0F0F0F= 840
31664 :0F00000000000000F= 30
31672 :0F0F0F0F0F0F0F0F= 120
31680 :0F0F0F0F0F0F0F0F= 120
31688 :0FF0F0F0F0F0F00F= 1470
31696 :0F0F0F0F0FFFFFFF= 840
31704 :FFFFFFF0F0F0F0F0= 1965
31712 :F00000000000000F0= 480
31720 :F0F0F0F0F00F0F0F= 1245
31728 :0F0F0FF0F0F0F0F0= 1245
31736 :F0F0F0F0F0F0F0F0= 1920
31744 :F0F0F0F0F0FFFFFF= 1965
31752 :FFFFFFFFFFFFFFFF= 2040
31760 :FF000000000000FF= 510
31768 :FFFFFFFFFF0F0F0F= 1320
31776 :0F0F0FFFFFFFFFFF= 1320
31784 :FFF0F0F0F0F0F0FF= 1950
31792 :FFFFFFFFFFFFFFFF= 2040
31800 :FFFFFF0000000000= 765
31808 :0000000000000000= 0
31816 :0000000000F0F0F= 45
31824 :0F0F0F0000000000= 45
31832 :00F0F0F0F0F0F000= 1440
31840 :0000000000FFFFFF= 765
31848 :FFFFFF0F0F0F0F0F= 840
31856 :0F00000000000000F= 30
31864 :0F0F0F0F0F0F0F0F= 120
31872 :0F0F0F0F0F0F0F0F= 120
31880 :0FF0F0F0F0F0F00F= 1470
31888 :0F0F0F0F0FFFFFFF= 840
31896 :FFFFFFF0F0F0F0F0= 1965
31904 :F00000000000000F0= 480
31912 :F0F0F0F0F00F0F0F= 1245
31920 :0F0F0FF0F0F0F0F0= 1245
31928 :F0F0F0F0F0F0F0F0= 1920
31936 :F0F0F0F0F0FFFFFF= 1965
31944 :FFFFFFFFFFFFFFFF= 2040
31952 :FF000000000000FF= 510
31960 :FFFFFFFFFF0F0F0F= 1320
31968 :0F0F0FFFFFFFFFFF= 1320
31976 :FFF0F0F0F0F0F0FF= 1950
31984 :FFFFFFFFFFFFFFFF= 2040
31992 :FFFFFF0000000000= 765
32000 :0000000000000000= 0
32008 :0000000000F0F0F= 45
32016 :0F0F0F0000000000= 45
32024 :00F0F0F0F0F0F000= 1440
32032 :0000000000FFFFFF= 765
32040 :FFFFFF0F0F0F0F0F= 840
32048 :0F00000000000000F= 30
32056 :0F0F0F0F0F0F0F0F= 120
32064 :0F0F0F0F0F0F0F0F= 120
32072 :0FF0F0F0F0F0F00F= 1470
32080 :0F0F0F0F0FFFFFFF= 840
32088 :FFFFFFF0F0F0F0F0= 1965
32096 :F00000000000000F0= 480
32104 :F0F0F0F0F00F0F0F= 1245
32112 :0F0F0FF0F0F0F0F0= 1245
32120 :F0F0F0F0F0F0F0F0= 1920
32128 :F0F0F0F0F0FFFFFF= 1965
32136 :FFFFFFFFFFFFFFFF= 2040
32144 :FF000000000000FF= 510
32152 :FFFFFFFFFF0F0F0F= 1320
32160 :0F0F0FFFFFFFFFFF= 1320
32168 :FFF0F0F0F0F0F0FF= 1950
32176 :FFFFFFFFFFFFFFFF= 2040
32184 :FFFFFF0000000000= 765
32192 :0000000000000000= 0
32200 :0000000000F0F0F= 45
32208 :0F0F0F0000000000= 45
32216 :00F0F0F0F0F0F000= 1440
32224 :0000000000FFFFFF= 765
32232 :FFFFFF0F0F0F0F0F= 840
32240 :0F00000000000000F= 30
32248 :0F0F0F0F0F0F0F0F= 120
32256 :0F0F0F0F0F0F0F0F= 120
32264 :0FF0F0F0F0F0F00F= 1470
32272 :0F0F0F0F0FFFFFFF= 840
32280 :FFFFFFF0F0F0F0F0= 1965
32288 :F00000000000000F0= 480
32296 :F0F0F0F0F00F0F0F= 1245
32304 :0F0F0FF0F0F0F0F0= 1245
32312 :F0F0F0F0F0F0F0F0= 1920
32320 :F0F0F0F0F0FFFFFF= 1965
32328 :FFFFFFFFFFFFFFFF= 2040
32336 :FF000000000000FF= 510
32344 :FFFFFFFFFF0F0F0F= 1320
32352 :0F0F0FFFFFFFFFFF= 1320
32360 :FFF0F0F0F0F0F0FF= 1950
32368 :FFFFFFFFFFFFFFFF= 2040
32376 :FFFFFFF600000000= 1216
```

Danger Zone

The in's and out's of the Clear command on the Dragon explained by ***Pam D'Arcy***

YOU MAY have tried to run some machine code and had quite unpredictable results occur because of having omitted to carry out a required CLEAR statement prior to CLOADM/EXEC. As some disk users have found out to their cost, failure to follow such operating instructions when a disk is in the drive can cause the catastrophic destruction of both the main AND backup directory sectors of the disk. "But the machine was clear . . . I had only just switched on . . . Such a major disaster from such a small slip . . ." are some of the comments.

I am afraid so, but here I offer this brief insight into what goes on in the Dragon's memory, in the hope that it will fix itself in the forefront of your memory and ring the danger bells before disaster envelops your system. Take a look at Fig 1 and the associated Table 1.

Even when you haven't given the Dragon any work to do, it is not idle. It is, amongst other things, continually checking for keyboard input and updating the TIMER value approximately 50 times a second. When carrying out such actions, it is using an area of memory for temporary workspace. This area of memory is known as the Hardware Stack.

Even when our programs are running, unseen to us, the Dragon continues to carry out the keyboard check and updating of the TIMER value, using the Hardware Stack for temporary storage, as before.

At switch on, the Hardware Stack starts at the highest address of Area D and works backwards towards the start or lowest address of Area D. It is not a fixed size, but expands and contracts (always from the highest address down) as is needed, though normally uses only a few bytes at a time when carrying out the hardware functions, such as checking for keyboard presses and TIMER updates.

This doesn't generally bother us unless we want to run some Machine Code in an area of memory that clashes with the Hardware Stack at any time or that a Basic program may be using that area for its variables storage. It is the corruption of these areas by our machine code that causes the chaos because it causes the Dragon to lose its way in its very necessary, strictly ordered, existence. The high address end of the Dragon, even more so at switch on, is particularly vulnerable.

The CLEAR statement is used to guarantee a 'safe' house for machine code, using the syntax: CLEAR parameter 1, optional parameter 2.

Area A — 1536 bytes reserved for Basic Interpreter workspace.
Area B — 1536 bytes automatically and only reserved for Dragondos if the cartridge is attached at switch on.
Area C — Default four graphics pages of 1536 bytes each.
Area D — Where our Basic programs are loaded into memory and the space that non-string and array variables occupy.
Area E — Default 200 bytes reserved for Basic simple string variable storage.
Area F — Default one byte reserved for machine code.

Table 1

Fig. 2
MEMORY MAP AFTER CLEAR 200,32200 AFTER SWITCH ON

AREA	-31999	32000-32199	32200-32767
	D	E	F

Parameter 2 is the start address of Area F — an area 'reserved for machine code use' (the manual is a byte out). Whenever this start address is changed, the start/end addresses of Areas E and D are automatically adjusted, that is, the highest address of Area E becomes this address-1, the highest address of Area D (and hence the Hardware Stack) becomes the highest address of Area E-length of Area E.

Parameter 1 is the required length of Area E. The highest address used is unchanged; its lowest address is the highest address — (parameter 1) + 1. The length of Area E is set to 200 at switch on, else is set as parameter 1 of the last CLEAR statement issued (whether from the keyboard direct or from within a program). This then automatically adjusts the highest available address of Area D, and hence the starting position of the Hardware Stack.

For example, if immediately after switch on, you wish to run a machine code routine that is 400 bytes long at its default load address of, say, 32200, if you do not make the 'safe' house for it, it will load into the area occupied by the Hardware Stack (see Fig 1) with unpredictable results.
By typing CLEAR200,32200 <ENTER> the resulting top end of memory map would be as shown in Fig 2.

The HARDWARE STACK now starts at address 31999, working downwards. One or more machine code routines may now be loaded into Area F, 32200-32767, and be EXEC'd with no fear of corrupting any of the Dragon's vital workings (unless the machine code itself is naughty!) and no fear of anything corrupting it unless a Basic or other machine code routine POKEs into this area directly.

To those who have suffered because of the Dragon's way of doing things, I can only commiserate and say — believe me, it is not a stupid way of organising things but a very powerful, dynamic system that outstrips other popular micros by miles.

Figure 1.
MEMORY MAP AT SWITCH ON
=====================

Cassette based system:

0-1535	1536-7679	7680-32566	32567-32766	32767
A	C	D	E	F

DragonDOS based system:

0-1535	1536-3071	3072-9215	9216-32566	32567-32766	32767
A	B	C	D	E	F

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If you've got a technical question write to Brian Cadge. Please do not send a SAE as Brian cannot guarantee to answer individual inquiries.

Dragon Answers

Cyclic Error

I WAS interested to read your reply in the February issue to RF Sibthorpe's query about Cyclic Redundancy.

The first disc I used to back-up all my taped programmes developed this error after the work had been done. I have done a sector search and isolated the error to one of the Directory tracks. I would like to know:

a) If there is a fault on one of the directory tracks, why does the machine not read the second one? What is the point of two copies of the directory if the back-up cannot be used?

b) How can I salvage this disc?

Paul Raxworthy
11 St Johns Road
Windsor
Berks
SL4 3QN

DRAGONDOS automatically keeps a backup of the directory on track 16, and uses the directory on track 20 for all its I/O. Quite why the authors of Dragondos never wrote the code to automatically use the backup directory if the main one failed is a mystery. However, you can salvage a disc with a directory error simply by typing in the following;

```
CLEAR 500
FOR S=1 TO 18:SREAD
1,16,S,A$,B$:SWRITE
1,20,S,A$,B$:NEXT
```

Port Whine

COULD you please tell me if there are any interfaces to connect an RS232 plug up to the cartridge port or the printer port? If there are none of these, could you tell me how to re-wire the lead to the cartridge port?

Philip Sutton
Foxhills
25 Salisbury Road
Farnborough
Hants

IT IS possible to buy an interface which will plug into the Centronics printer port and convert the parallel output to RS-232 serial data. However, these are quite expensive (Inmac produce one at £145).

A cheaper solution is to use an interface which plugs into the cartridge port.

For example, Compusense can supply a combined RS-232 and Input/Output interface for around £60, which includes software on ROM.



Slow 3-D

I HAVE written a machine code program to rotate 3-dimensional objects on the screen, like the Basic program in February's *Dragon User*.

At the moment it calculates the screen co-ordinates and then returns to Basic for the LINE command to be used. This obviously slows the program down, so could you tell me how to use the LINE command from machine code?

C Parkinson
95 Park View
Moulton
Northampton
NN3 7UZ

UNFORTUNATELY, it is not a simple matter to call the ROM's line drawing routine from machine code. In fact, doing so will not speed up your program very much anyway, as the majority of the time is spent in the routine, and not in the Basic evaluating the coordinates.

The reason the ROM routine is not that fast is that it has been written to work in any of the Basic graphics modes. Using variables, and no literal numbers in the LINE command will speed things up a bit, but the only real way to get very fast line drawing is to write your own routine which operates in one mode only.

Copy

I OWN a Dragon 32 with Dragondos and one disk Drive. What I would like to know is, is there any way of speeding up the copying of disks, and reducing the number of swappings necessary, as it takes a long time to copy just one disk with only one drive.

Frank Steele

THERE ARE basically two things you can do to speed up disc copying on a single drive system. Firstly, as the Backup command uses all the RAM it thinks is available, removing all the graphics pages will decrease the number of disc swaps necessary. This can be done by typing, as a direct command;

```
POKE 25,12:POKE 3072,0:NEW
```

Secondly, turning off the automatic verification will stop each sector from being re-read after being written. This can speed things up quite dramatically, but you do sacrifice the security of knowing that the backup disc is a perfect copy. Typing VERIFY OFF will stop verification, remember to turn it back on with VERIFY ON afterwards.

Strings

PART OF a program I am writing involves adding and subtracting strings of numbers, such as "3+8−23+1", etc. I have tried using the VAL command, as in X=VAL("3+8−1"), but this just returns the value of the first number. Can you tell me what I'm doing wrong, or suggest a solution?

Paul Ranson
Coventry Road
Sheldon

THE VAL command only expects a single literal number in the string as its argument. What is needed is an EVAL command, which the Dragon lacks.

The routine listed below is a very simple 'expression evaluator' which can be called to return the value of the string *A$* in the variable *T*. As it stands only addition and subtraction are allowed, but the routine could easily be expanded to deal with other operands and parenthesis.

```
500 P=1:L=LEN(A$):GOSUB
    560:T=V
510 IF P>L THEN RETURN ELSE
    OP$=MID$(A$,P,1):
    P=P+1
520 GOSUB 560
530 IF OP$="+" THEN T=T+V
540 IF OP$="-" THEN T=T-V
550 GOTO 510
560 FOR J=P TO L
570 IF INSTR("0123456789",
    MID$(A$,J,1)) THEN NEXT
580 V=VAL(MID$(A$,P)):P=J:
    RETURN
```

Wordy Problem

PLEASE could you tell me how to make the following program accept a word instead of just one letter. I want the input to be ignored with a buzz if the word is wrong.

```
100 K$=INKEY$:IF K$=""
    THEN 100
110 K=INSTR(1,"A",K$):IF
    K=0 THEN SOUND 1,1:
    GOTO 100
120 REM rest of program
```

Howard Woodcock
2 Seabrook Cottages
Topsham Rd
Topsham

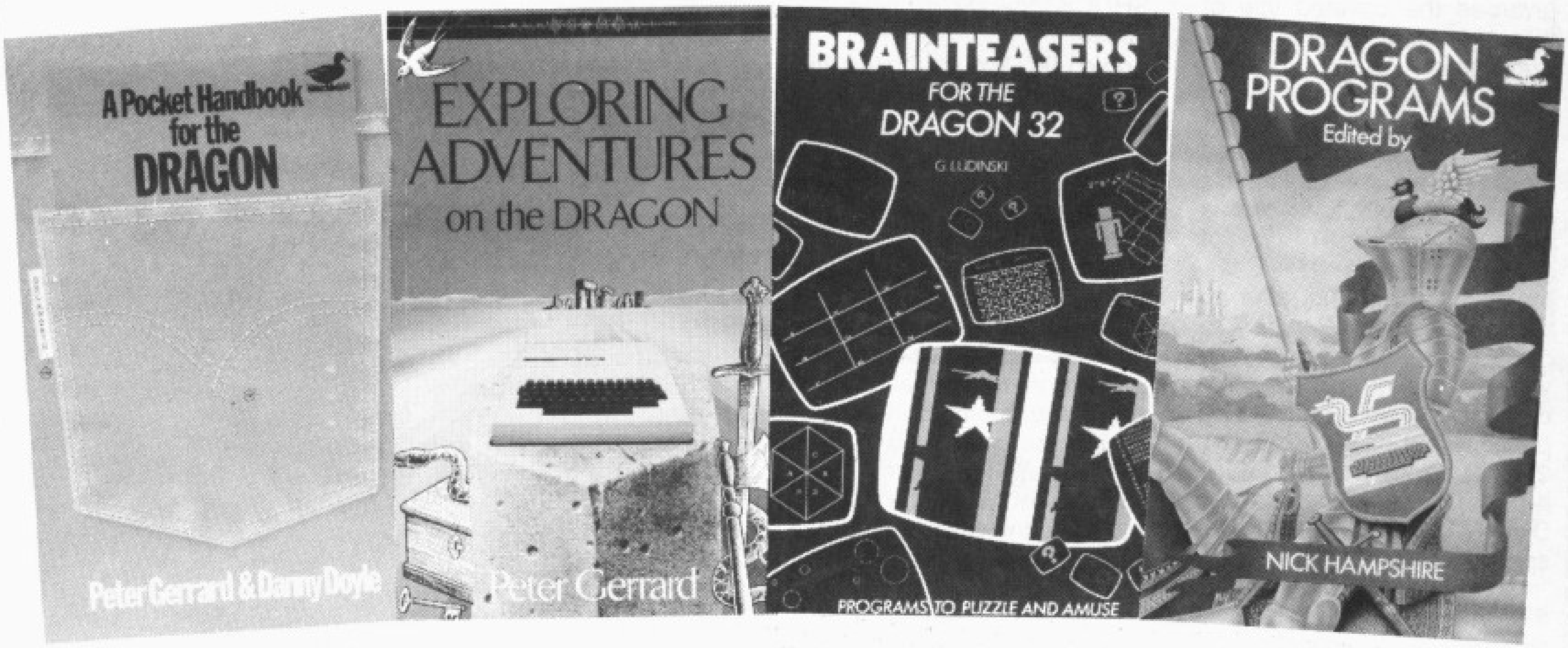
FROM your letter, I assume that you are trying to check for a password in your program. The routine below will wait for the word in P$ to be typed in, but will not print the characters typed:

```
500 P$="PASSWORD":W$=""
510 K$=INKEY$:IF K$=""
    THEN 510
520 IF K$=CHR$(8) AND
    W$>"" THEN W$=LEFT$
    (W$,LEN(W$)-1):GOTO
    510
530 W$=W$+K$:IF LEN(W$)
    <>LEN(P$) THEN 510
540 IF W$<>P$ THEN SOUND
    1,1:GOTO 500
550 REM Rest of program . . .
```

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HELLO AGAIN, and welcome to a very special column. Yes, this is a celebratory column. This column is two months old today! And all over the country the celebrations have started, dancing in the street, dancing in the dark, strangers in the night, exchanging glances, wandering in the night, what were the chances, that The Expert might write a complete column without mentioning arcade games?

Yes, indeed, this is the second edition and I'd like right now to thank all those of you who wrote saying how wickedly zany you found the first one. In fact this column was awarded the coveted title of "Best Arcade Column In A Publication Called Dragon User". I stand a proud man.

So, to work. Thank you for the Pokes you have sent and please keep them coming, this month's contribution comes from one Mr M R Vine of Dagenham (nothing like formality is there), who, after an affectionate dig at Paul D Burgin has presented pokes for your delectation. He says that the colour location should be poked with 224, 232, 240, and 248 for Green 4-colour, Buff 4-colour, Black/Green, and Black/White screen colours respectively.

Some of these pokes require the autorun to be disabled using the aforementioned Paul Burgin's methods (see Letters Dragon User, February '86). Here they are:

DUNKEY MUNKEY: LIVES 15120, COLOUR 19862
ASTRO-BLAST: COLOUR 21067
SCREAMING ABDABS; COLOUR 10999 (BUFF IS BEST)
JET BOOT COLIN: COLOUR 7329
MUDPIES: COLOUR 22902
MANIC MINER: COLOUR 13825, LIVES 13146 (UP TO 25 ONLY)
CAVERNS OF CHAOS: COLOUR 26860, LIVES 26865 (POKE TO ZERO FOR 100 LIVES)
COSMIC CRUISER (Do you mean crusader?): LIVES 9398 (POKE TO ZERO FOR UNLIMITED)
CUTHBERT IN THE COOLER: LIVES 8295 (MAX 14)
CHAMBERS: LIVES 13339 (This does not work on the Pterydactyl edition)
MOONHOPPER: COLOUR 12827
QUAZIMODO: LIVES 15644
ROMMEL'S REVENGE: LIVES 16516
TUBEWAY ARMY: LIVES 12367, STAGE 12388 (1-6)
JET SET WILLY: COLOUR 7859
CAVE FIGHTER: LIVES 27078 (POKE TO ZERO FOR UNLIMITED)
GALACTIC RAIDERS: LIVES 19664
HORACE GOES SKI-ING: COLOUR 28356
ROBIN HOOD: LIVES 15712, COLOUR 19884
SEA DRAGON; COLOUR 20599
SHOCKTROOPER: LIVES 13895

And so Mr Vine claims the title of "King of the Hackers", unless, as Esther would say, you know better.

The next item was good fun, and, what's more, it works! It comes from Simon Mythen who lives in Chertsey (see you down the lock some time Simon?) and runs thus . . .

"After recently purchasing *8-Ball* from Microdeal" (where have you been for the past million years Simon?), "I was determined to find some sort of formula for potting all seven balls and the eight-ball. Well, I have succeeded! The procedure is as follows:

Break — Put the joystick in the top left position. The flashing line will appear after pressing the fire button. Leave the joystick where it is and press the fire button again. Finally, give the ball at the top, top right spin. Then, hit the ball with maximum force.
2nd Shot — Put the joystick in the bottom left position. Use bottom left spin and hit the ball with the third power.
3rd Shot — Again, bottom left on joystick and top right spin. Use full power.
4th Shot — As the second shot but use full power.
5th Shot — Top left on joystick and top right spin. Third power.
6th Shot — Joystick top right and for spin put the joystick slightly to the right of middle bottom. Maximum force.
7th Shot — Leave the joystick where it is. Top left spin and second power.
8-Ball — Make sure that the flashing line passes straight through the middle of the 8-Ball, use middle spin and the second power."

I've tried this and believe me it works (even a Cabinet Minister can do it and they have very, very, very small brains!) and it's great. If you have any "solutions" to other arcade games then please send them in. I think you'll agree that they're more fun than Pokes!!

Just to make things interesting this month, below you will see a number of screen shots of some old Dragon games — just like a stroll down memory lane, isn't it?

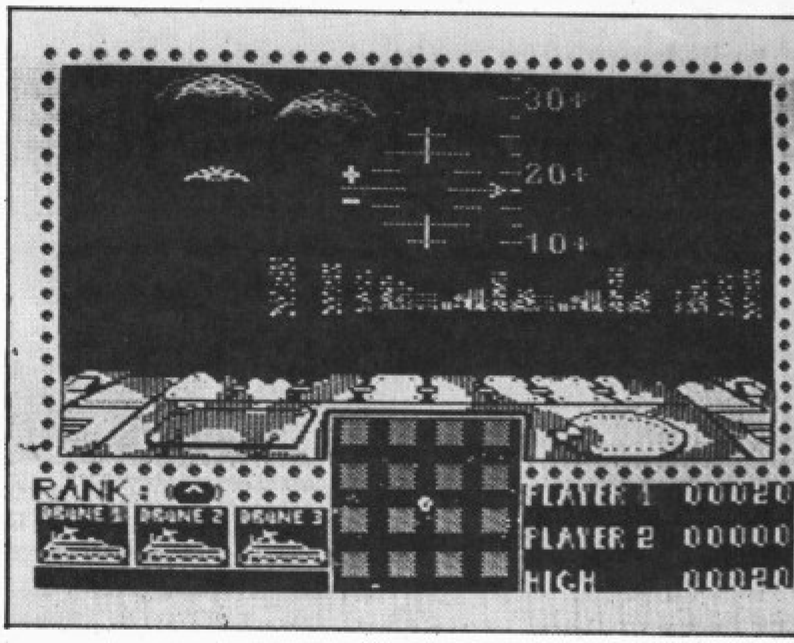
Well — if you think you can identify them, then write in to me — and the first one out of the hat (the ceremony to take place on June 13) will win a year's worth of subscription to this august journal. Best of luck!

So, that's about it for this month, except to say to D. Fowler of Glasgow that if he ever sends me another letter in that luminous green pen I shall personally come around and show him a new use for "Jet Set Willy" possibly redefining it in the process! Because he has won the award for "Worst Letter Ever Written Ever Since Year Dot When The World Began Ever" I do not intend to tell him the poke he wants for "Jet Set Willy" for several months, even though we'll be publishing a map next time!

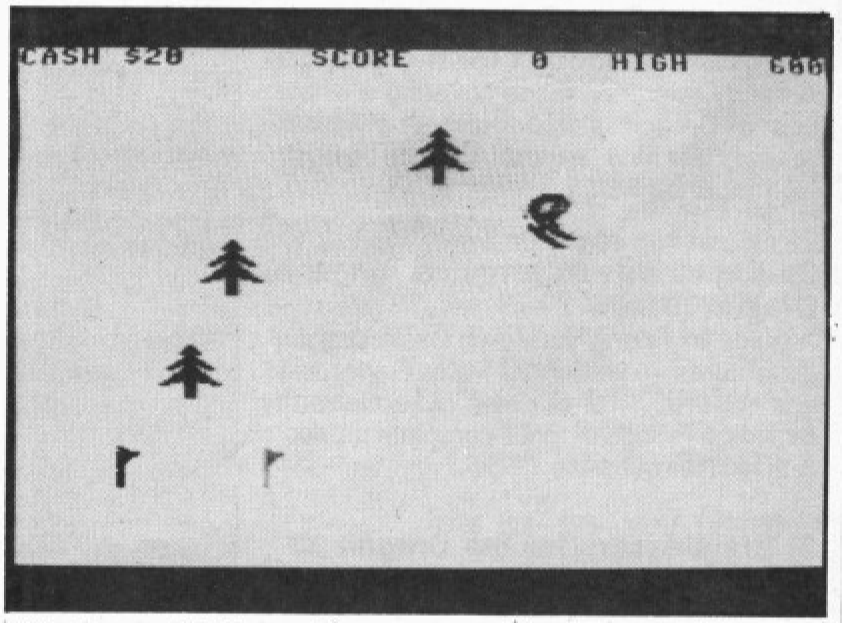
So, that's it for this award winning second birthday column. I wonder if this one can win the award for "Most mentions of Cabinet Ministers ever in an arcade column in a magazine called Dragon User", let's hope so, eh?

Remember, Cabinet Ministers are human too.

Remember, Arcade column writers often lie.



Mystery Picture A



Mystery Picture B

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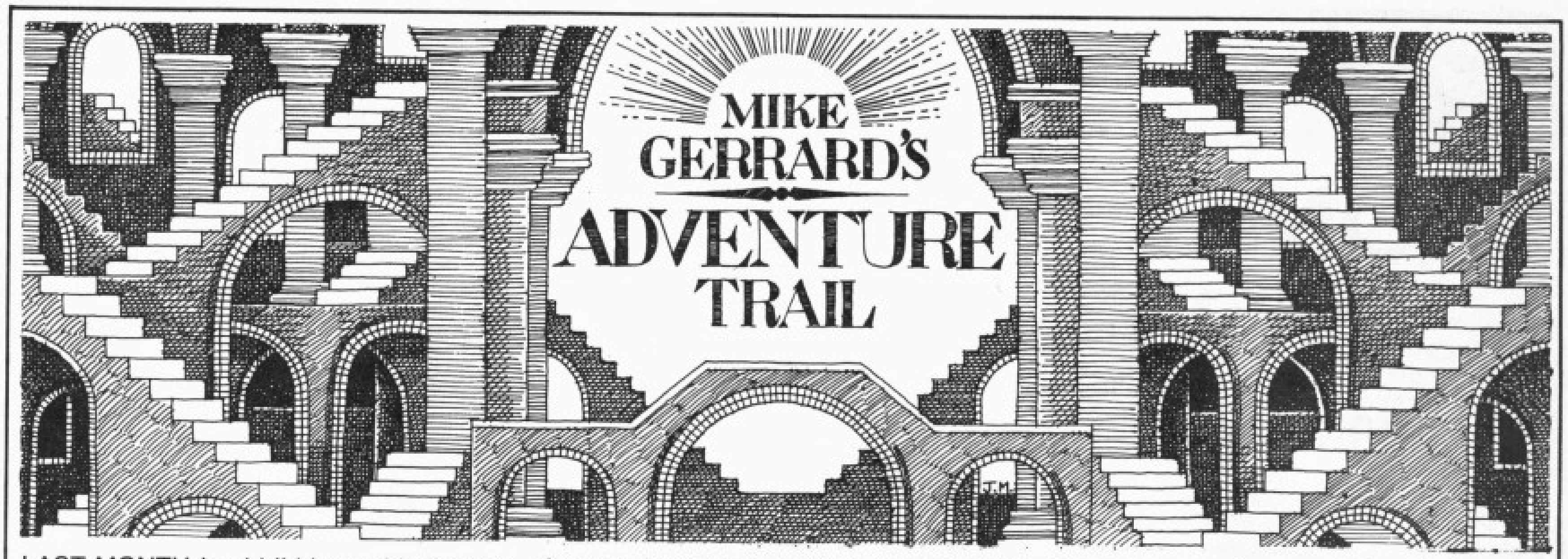
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LAST MONTH I said I'd hope this time to look at both *The Weirds of Kesh* and *Space Trek II*, so being a man of my word I'll do just that. Let me deal with *Space Trek II* first, and if you read the last column you'll know I was very enthusiastic about *Space Trek I*, written by a reader and being sold by him in his guise as Broomsoft. This was quite a comprehensive adventure — I don't mean it was set in a school, but on board the starship Endeavour. Though the plot was derivative of many a *Star Trek* tale, the program was well done and the game had many unusual and enjoyable touches.

Sequel

So what of *Space Trek II?* Sad to say it relies rather too heavily on the first program, although the story has moved on somewhat. You have managed to arrive at the planet Foskirb, and the first starship Endeavour is circling above it — you're in the fifth shop in the Endeavour series, and have to find out what happened to the first four. Here's one of them at any rate, and a scan of the ship has given you the useful information that the crew have all lost their minds. Probably been watching too many *Star Trek* repeats. But no, their ship is trapped in a strange force coming from the planet, and you must organise a landing party to find the minds, beam them up and disengage the force.

The program works in the same way as the first part, in that you can switch between any of four characters: James, Selvon, Spears and McCrindle. Just as impressive as before, except that the author has decided that the adventure will still begin by centring on the vast number of locations on the Endeavour V. I explained last month that the starship really is vast, and mapping it out gives you the feeling of actually exploring the shop as you move up and down between the six different levels of locations. As you begin *Space Trek II*, you soon realise that the starship has been reproduced exactly as before, and you encounter the same objects and people in the same places as first time round. I found this to be very disappointing and an awful waste of precious memory.

I admit to being limited on this as I hadn't worked out from the first game how to get off the ship and on to the surface of the planet beneath, and perhaps when you do this the adventure opens up more and becomes very different, but even if that is the case I can't see that there's going to be the memory available to make *Space Trek II* sufficiently different from its elder brother. A quick inspection of the unprotected program shows the locations that are on the planet's surface, but they're far fewer than the ones in the starship that are duplicated from Part I. With the ability to switch between characters and move them independently, the game should have perhaps begun with them already down on the planet, which would mean you could have had any type of setting that you cared to create — jungle, desert, deserted city — and made it much more comprehensive, and as convincing as the first part was.

Nevertheless, if you're at all interested in adventures and particulary in writing them, you should invest £4 and get at least one of these two titles from Broomsoft at 30 Broomhills, Welwyn Garden City, Herts AL7 1RF. I'd certainly like to see some more from the same author, but with settings sufficiently different.

Very different in its approach is *The Weirds of Kesh,* also written by a regular reader, Bob Aldridge form Enfield, and now available for £5.95 from Quickbeam Software, 67 Old Nazeing Road, Broxbourne, Herts EN10 6RN. Though it's been out a short while now, Quickbeam's boss was telling me that very few copies have been sold, which I can't understand as it's a very good adventure. What's wrong with you adventurers out there? Every month I get lots of letters complaining that there are so few new Dragon adventures, and yet when people bring them out no one seems to bother buying them!

Brigands

End of sermon and on to the game itself which is also going to be a multi-part adventure, if enough people buy this first part, subtitled *'Skull and Bones',* In this, your role is as the only child (male or female, and that's later relevant) of a poor tradesman in the seaport of Ras Sharna. On his deathbed you father gave you a gold ring, and begged you to return it to the inner sanctum of the Temple of Kesh. This you set out to do, but when just in sight of the Temple a gang of brigands rob you of all your possessions and dump you in an oasis.

With this watery start you begin the adventure, and it's important to read this and other location descriptions carefully, as clues are sometimes contained in them as to what you should do or where you might try to go. The parser that reads your two-word inputs is a little fussy, and frequently you're searching round for the right couple of words even though you think you know what it is you should be trying to do. If this aspect of the game's vocabulary is a bit restricting, the location descriptions certainly aren't, which is something that enhances the game. A lot of care has been taken to make the text more descriptive, such as in the lonely waste land where you find not merely a dead tree but: "A dead tree stands close by like a skeletal monument to some dead hero." Or outside Selim's Cave where "thin wisps of smoke drift out of the entrance and curl gently upwards," though little do you know from that soothing description what awaits you inside the cave!

Input

The program response tends to be rather slow, and it's a little irritating that once the reponse to your input has been printed, you then have to press another key to have the screen updated, after a suitable pause. Also, what initially seems like a virtue later proves to be something of a drawback. This is the feature that gives you a full location description on your first visit, but only a brief one should you return to that place. For the most part this doesn't matter, but in one place I found a red dragon barring my way, then when I later returned with what I hoped might see the beast off, it was no longer there. At least it seemed not to be, so I was at a loss for a while as to what to do. Then I typed LOOK to summon up the full location text and there was my adversary . . . which I promptly dispatched.

These little drawbacks don't prevent your enjoyment of the game, however, and this is definitely one that's more suited to the patient and experience adventurers. Fewer locations, it seems, than the two *Space Trek* adventures, but more description and tougher problems all round. Try it.

Now I recently reviewed Cowen Software version of *Colossal Cave,* and mentioned that it didn't have a SAVE feature, which the original mainframe version of this classic adventure didn't have either. That has now been rectified, however, and the command STOP will send you into the SAVE routine, so don't let that lack put you off sampling this abbreviated version of a piece of

adventure history.

Finally on to some of the epistles you've sent me this month. Carl Truett of 11 Hayden Road, Rushden, Northants NN10 OHX has completed a few adventures now, but is struggling to map *Juxtaposition.* He asks if anyone has made a successful map of the lands, which they might be prepared to photocopy and let him have "at a small cost." Over to you, map-makers.

Some clues on that same game come from Michael Emsley, 3 Ladywell Road, Kintore, Aberdeenshire AB5 0UG. He reminds other readers that you need to use the camera twice, and that you should be able to cross the Yellow Baron's lands by starting at the fortress of Baronesses Brown and Green and moving carefully from building to building. In return, Michael would like someone to tell him if you can control the bus in *Cricklewood,* and also help with three questions on *El Diablero:* how to get the eagle's feather; where to dip the stick; and what use are the two columns.

Sgt John Moore of RAF Wildenrath plays adventurers when he's not knocking back cheap beer in the Sergeant's mess, and he's currently lost, wandering round the endless Rez Zone in *Juxtaposition.* My first advice could be REEB EHT FFD YAL, John, but more helpful is a simple MEHT RETNE OT DEEN ON SI EREHT.

More successful in this game, which does seem to be dominating the postbag lately, is Ola Eldoy, one of several Norwegian readers I hear from regularly, Ola's scored 87% so far, with all ID tags except the black one, so maybe by the time this appears you'll have successfully completed that and have your order in for the follow-up, Ola. He's also written for himself a little machine code routine which has enabled him to list all the available commands in *Trekboer* and *El Diablero.* There are too many to list here, but if anyone thinks they might be useful send me sae and I'll make a few copies available.

More room to list a few magic words from Mark Ingram on *The Ket Trilogy:* HTILONOM and !KEELB !KEE. I'll leave you to figure out where they work. Thanks also to Ray Thomas of Haverfordwest and C Vaughan of Cardiff for clues on *Sea Quest,* and a final piece of help to Stephen Langdell of Carterton who was having trouble breathing on the Forest Moon in *Return of the Ring.* For that you need a KSAM REHTAERB, Stephen, and you get that from the EROTS LARENEG, but only if you've reached Gestalt Level 2. That's something that applies to both Wintersoft's 'Ring' adventures — if a problem seems insoluble, it may be because you haven't built up enough experience to enable the solution to the problem to became available to you.

Experience tells me I'll be back again next month, and do let me know if there's anything you feel isn't sufficiently covered in the corner; won't you?

Adventure Contact

To help puzzled adventurers further, we are instituting an Adventure Helpline — simply fill in the coupon below, stating the name of the adventure, your problem and your name and address, and send it to Dragon User Adventure Helpline, 12/13 Little Newport Street, London WC2H 7PP. As soon as enough entries have arrived, we will start printing them in the magazine.

Don't worry — you'll still have Adventure Trail to write to as well!

Adventure ....

Problem..

....

Name ....

Address..

....**June 86**

Adventure Contact

Adventure Return of the Ring **Problem** Need help on getting magic grain, Book of Skulls and amulet **Name** Gary Bird **Address** 10 Millfield Terrace, Station Road, South Wirral, L66 1HD.

Adventure Shenanigans **Problem** How do I get out of the city? Do you go down Fire Escape — and if so, how? **Name** Joe Shepherd **Address** 60 Pound Street, Warminster, Wilts, BA12 8NR.

Adventure Return of the Ring **Problem** Where can I find the stone? **Name** D Penman **Address** 63 Gean Road, Alloa Clacks, Scotland, FK10 2JP.

Adventure Trekboer **Problem** How do I cross the deep chasm in the garden? **Name** D Penman **Address** As above.

Adventure Ring of Darkness **Problem** I can't get enough hit points to get to the other side of the map. Any other help would be nice, too. **Name** Richard Bradley **Address** 3 Cornsay Close, Acklam, Middlesbrough, Cleveland, TS5 8PS.

Adventure Trekboer **Problem** I have opened the grate in the 'large underground System' but cannot get past the second spider. Help! **Name** John Patten **Address** 65 Springfield Avenue, Brough, North Humberside, HU15 1BX.

Adventure Jerusalem Adventure 2 **Problem** How do you get through the golden gate? What happens at the Dead Sea? **Name** Malcolm Burns **Address** Brcomlees, Kilconquhar Elie, Leven, Fife, Scotland.

Adventure Juxtaposition **Problem** I can't get the emerald — what use is the girl at the laserteque? **Name** Paul Knight **Address** 27 Fobbing Road, Corringham, Stanford-le-Hope, Essex, SS17 9BG.

Adventure Ring of Darkness **Problem** Any help please — also, where can I find the Jelly Cube? **Name** Gareth Mitchell **Address** 23 Cherry Tree Avenue, Church Lawton, Stoke-on-Trent.

Adventure Mission One **Problem** How to get rid of the droid at the lift entrance? **Name** Christian Bird **Address** 4 Kenpas Highway, Coventry, CV3 6BN.

Adventure Juxtaposition **Problem** How do you get the food? Where is Baron Red's fort? **Name** Simon Jones **Address** 37 Collins Meadow, Harlow, Essex, CM19 4EN.

Adventure Trekboer **Problem** Once at planet, how to get to the surface? How to light the 'Dark Room'? **Name** Richard Boardman **Address** 13 Orchard Close, West Ashton, Trowbridge, Wilts.

Adventure Trekboer **Problem** How do you get across the chasm on the Planet Alton? Can offer help on Franklin's Tomb, Lost in Space, Fishey Business, Mansion Adventure, Jerusalem Adventure 2 and Williamsburg Adventure 3. **Name** C. A. Jones **Address** 17 Nant-Y-Ffynnon, Brackla, Bidgend, Mid Glams.

Adventure Shenanigans **Problem** How to get the 12ft pole into the cave and how to read the billboard? **Name** Paul Sharpe **Address** 165 Hallam Crescent, Braunstone, Leicester, LE3 1FH.

Adventure The Ket Trilogy — Temple of Vran **Problem** How to get into the small hole? **Name** Peter Hessett **Address** 67 Old Greenock Road, Bishopton, Strathclyde.

Adventure Juxtaposition/ Wings of War/Pettigrew's Diary/El Diablo **Problem** Where are the Deeds of Brown? How do I reach the Bomb? How do I get into the Island House? Where is the Oil? **Name** Sgt Scott Shaw **Address** c/o Sgt Shaw DC, HQ Sqn MT, 22 Sig Regt, BFPO 107.

Adventure Barons of Ceti-V **Problem** I can't find the blue key card, and I can't avoid the blue key card, and I can't avoid the assassination droid **Name** Mr D Farrar **Address** 6 Woodbine Street, Ossett, W Yorks.

Adventure I cannot get past the portcullis, and can only find the torch and the rope in the throne-room **Name** Mrs M. Green **Address** 10 Rowan Close, Thetford, Norfolk, IP24 3EU.

Adventure Sea Quests **Problem** Where do I get the key to gain entry to the beach house loft? How do I use the detector? **Name** Matthew Saunders **Address** 16 Vale View, Risca, Gwent, NP1 6HS.

Classified

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JUNE PUZZLE

***Gordon Lee** takes a random walk around number generation — and sets this month's poser*

READERS with programming experience will be familiar with the "random" feature available in Basic, although this is a command which must be used with care, as we shall see later. Outside computing, tables of random numbers are used for statistical sampling techniques. Even so, this use is a relatively modern phenomenon. I can do no better than quote from an article by Alfred M. Bork on the subject. "... before the twentieth century no one would even have thought of the *possibility* of producing books like this; no one would have seen any use for it. A rational nineteenth-century man would have thought it the height of folly."

Methods used for producing lists of random numbers have been many and varied. In 1927, a table of 41,600 random digits was produced by taking the middle digits of the areas of parishes in England, while in 1949, a table of 105,000 digits was extracted from United States freight waybills. Other methods have involved dice, roulette wheels, and measurement of the rate of decay of certain radioactive isotopes.

With the arrival of computers (and calculating machines before them) it was soon realised that a random number facility which could be used in conjunction with these machines would be an advantage. Clearly, programming in an actual table of random numbers would be both impracticable and wasteful of memory, so methods were devised which would enable the machine to generate its own series of random numbers.

An early method proposed by John van Neumann was known as the "middle of the square" method. Here the computer is first "seeded" with a random sequence of digits chosen by the operator. The computer then squares this number, extracts the middle digits of this square and repeats the procedure as often as required. For example, if we were to start with the number 5678, and extracting the middle four digits each time, we would get the series 5678; 2396; 7408; 8784; 1586; ... and so on. Note that in generating this series, any square with less than eight digits is supplemented with extra zeros added to the left-hand side of the number to bring the total number of digits to eight, before the middle four digits are extracted. This method rapidly fell into disfavour as the sequences produced were too short, usually terminating in an endless loop of repeating values. Consequently, other, more sophisticated techniques were devised.

As was mentioned earlier, the random number generator on the Dragon is stright-forward in use, but requires a little care to ensure a truly random selection. For example, after switching on the Dragon type in and run the following line: FOR N=1 TO 10: PRINT (RND(9)):NEXT.

As you might expect, the computer will dutifully print out a list of ten numbers at random, each number being in the range of 1 to 9. There is nothing surprising about this, but what *is* surprising is that the numbers so produced are *always the same sequence*. In the case quoted, a sequence 5, 3, 2, 6, 5, 3, 6, 3, 1, 8, was produced. In practice, this means that some device needs to be written into any program to prevent this degree of predictability occurring. A program which, for example, deals a hand of cards is of little use if it always selects the same cards everytime that the game is run from "cold".

Next month we will be looking at ways around this problem, but in the meantime readers might be interested in the following curiosity based on a random number selection routine. First of all switch on the Dragon from cold and then type in (or load from tape) the following program:

```
10 CLS: X=15: Y=7
20 PRINT @ Y*32+X,"*";
30 R=RND(4)
40 IF R=1 THEN X=X-1
50 IF R=2 THEN Y=Y-1
60 IF R=3 THEN X=X+1
70 IF R=4 THEN Y=Y+1
80 IF Y=-1 THEN 80
90 GOTO 20
```

When run, the program prints a star in the centre of the screen and then selects a series of random numbers in the range one to four inclusive. A route is then traced moving up, left, down, or right, depending on whether the random number was one, two, three or four respectively. At each new location another star is printed to mark the path taken. Line 80 stops execution of the program when the path extends beyond the top edge of the screen. The curious feature is that (at least on the author's Dragon) the pattern so produced resembles the Dragon logo! Remember though, that each time the program is run the computer must first be switched off, then on again, and the program reloaded.

For this month's competition we are returning to John van Neumann's "middle of the square" method of producing a series of random digits. As was mentioned, certain numbers produce short sequences, some even are self-repeating. One such example is 3792 whose square is 14379264. However, can you find a four-digit number, all of its digits being different, which repeats itself after *four* operations? Good luck!

Prize

For the June competition, we've got something to excite Dragon arcade fans — the lucky winners will be receiving a copy of Gordon Bennet, from Smithson Computing, which they describe as, "a multi-screen megagame for the Dragon 32/64." Hold on a bit — they also say it's, "thoroughly daft, silly and enjoyable," ... and with man-eating toilets on the loose, I'm not arguing with that! In any case, surely a prize fit for ... a competition winner?

Rules

As usual, to win the game, you must show the answer to this month's competition and show how you solved it, with the use of a program written on your Dragon. For the sake of our strange administrative purposes, please do not send in cassettes containing a copy of the program, and don't forget to mark your entry — JUNE COMPETITION. And we know it sounds obvious, but don't forget to clearly mark your name and address on your entry — someone always forgets ... and next month we're threatening to publish the offenders in a Hall of Shame, so watch it!

This month's tiebreaker — yup — you're going to have to come up with another of those phrases. Try completing the following in less than 10 words — 'Bathrooms can be dangerous because ...' Anything rude will be circulated around the office, and then disqualified!

March Winners

The March goodie giveaway was 25 copies of Quickbeam's 6809 express — and congratulations go to the following, who will soon be receiving their prize: M Owens of Tonteg, Rachel Edmunds of Sedgefield, Dave Lardner of Rutherglen, Ray Woods of Barkingside, J Taylor of Acklam, Nils Lindgren of Sweden, C Dean of Enfield, C Richardson of Hessle, Douglas Moutrie of Rainham, G Hunt of Carnforth, J Slinger of Tylers Green, A Breakwell of Wyken, Richard Moss of Blackpool, E Newman of Addlestone, Mark Heaps of Washingborough, G Barber of Sutton Coldfield, D Marsden of Garston, D Gray of Middlesbrough, Hywel Roberts of Newport, P Weedon of Alderley, M Stonton of Stoke Bruerne, Simon Aubrey of Swindon, Kieron Brooks of Abercarn, J Gilcreest of Carshalton, and finally Matthew Oldfield of Noarthampton.

The tie-breaker produced many fascinating epigrams, but Matthew provided the best, with "The train approaching Platform Five is the (screeching feedback) to (incomprehensible destination) stopping at (rambling double dutch)." Will Philippe Elkouby of France please write in and explain his entry — which went ... "it was observed ... there was hundreds of cows." It obviously loses something in translation — and we're losing sleep trying to plumb its enigmatic depths.

Solution

For those still struggling (or those who got it wrong!) the answer was 0.744 feet or 8.92 inches.

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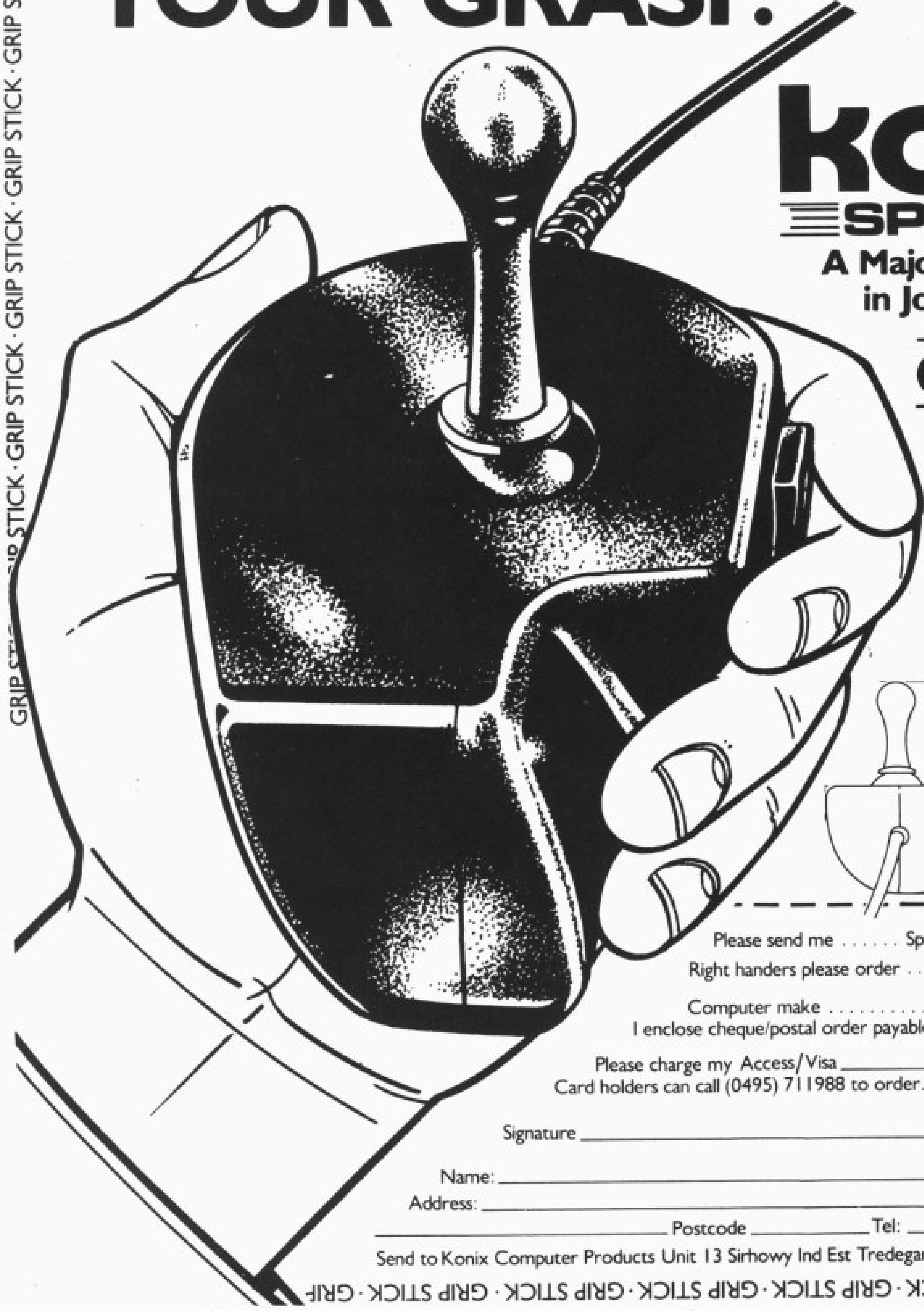
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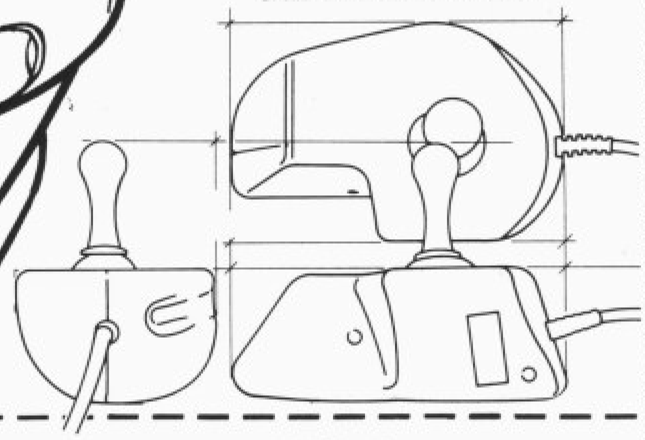
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